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ORIGINAL ARTICLES

THE RELATION OF THE THIRD MOLAR TO THE DEVELOPMENT OF THE MANDIBLE*

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THROUGH centuries of use, the human family has established a condition of the occlusion and arrangement of the dental organs that is most favorable for their function. This condition has become known as normal occlusion. When a variation from the normal occurs, which becomes a disadvantage, or which causes a disturbance of normal function of an organ, we naturally look to discover, if possible, the cause of the deviation from normality. One of the perplexing problems which confronts us in the study of the normality of the teeth is the influence which the third molar sometimes exerts upon the occlusion during its process of eruption.

Taking as our premise that normal occlusion of the teeth is very largely dependent upon the normal development of the jaws, then it would seem germane that for at least a basis of discussion we consider the relation of the third molar to the development of the mandible.

Statistics seem to show that evolution has played a very important rôle in the acquisition of the imperfect jaw in civilized man. Just how much the changes of environment and methods of living during the passing of the centuries has influenced the growth and development of the jaws is problematic. The paleolithic man depended upon his physical strength for his food and protection. The jaws in these men were longer and the teeth somewhat larger than those of today. The bones were large with marked prominences upon them for the attachment of muscles, and we can infer that the muscles were large and strong. Eating and chewing were evidently of more importance to these people than speaking.

*Read before The American Society of Orthodontists, Chicago, Ill., April 9-11, 1923.

Today man is no longer required to procure his food by his teeth, or to protect himself with his jaws. He is no longer required to live on coarse foods that require a great deal of mastication, which provides exercise for the muscles of that function and through these muscles a stimulation for bone growth. Therefore, he is deprived of some of the stimulating influences that seemed to be necessary to produce the large and powerful jaws of the prehistoric man. The disciples of Darwin believe that as we ascend the scale in so-called civilization, we lose some of the factors that were necessary for the maintenance of life in the primitive man. Much of our food today is prepared in such a manner that mastication is almost unnecessary, and little or no muscular stimulation to the jaws is exerted. It is thought by some, that as a result of our present methods of living, its influence must be felt in the arrested development of the jaws, that

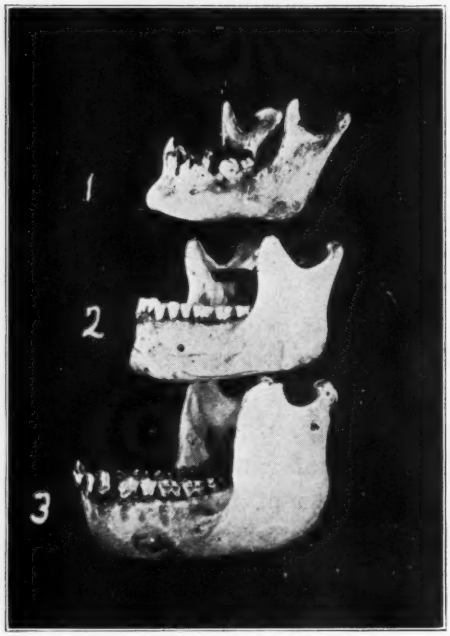

Fig. 1.—*1*, Civilized Man; *2*, Esquimo; *3*, Chimpanzee.

Fig. 2.—Patient 14 years of age, had surgical operation on the jaw at 6 years of age. Mandible has not developed since operation.

the maxillae are becoming shorter, and in time the third molars will entirely disappear. This, in the writer's opinion, is only theoretical, however, as the anthropologic data are at the present time not complete, nor all authentic. (Fig. 1.)

Probably one of the greatest factors which goes to influence the physiologic phenomena of growth and development of tissue is that of stimulation. In the growth and development of the jaws we can easily fancy that a great influence in the normal or abnormal development of the osseous structure of the jaws must be exerted by the stimulation produced in the development and eruption of the teeth, on one hand, and by the stimulation of muscle strain on the other. The character of the muscle strain is influenced by mastication, deglutition, and respiration.

A striking illustration of the influence of stimulation to the developing bone by the development and eruption of the teeth may be seen in cases where the deciduous and the oncoming permanent teeth have been removed as a result of surgical procedure. Here we find normal development is retarded or arrested altogether. (Fig. 2.)

An illustration of the influence of muscle strain is to be found in cases of osseous ankylosis of the jaws. When the mandible is deprived of normal movement in early childhood, the result may be seen in the abnormal development of the bone. (Fig. 3.)

Fig. 3.—Ankylosis of mandible.

Fig. 4.—Acromegaly (after Cushing).

Another factor that might profitably receive the attention of dental investigators in considering the growth and development of the mandible is the influence which the glands of internal secretion exert on the whole skeletal development. Walton, in a paper on "Surgery of the Pituitary Gland" says it is one of the most distressing and disheartening things in life to realize how largely our appearances, our actions, our morals, and our very destinies are dependent upon our internal secretions over which we have no control. In another paper published last November on the same subject, this same author states that "a large amount of evidence has ac-

cumulated to make it perfectly definite that the anterior lobe of the pituitary gland controls the metabolism and growth of the skeleton, including the bones, cartilage, and connective tissues." If there is an increase in function of the anterior lobe of the gland in young patients, it predisposes to giantism. On the other hand, when there is a decrease in function of the gland in young patients, it is manifested in lack of growth. The influence of increased function of the gland on the growth of the mandible and maxillae in adults is very striking in acromegaly. (Fig. 4.) There is usually a very marked separation of the teeth showing a definite increase in growth of bone. This condition was first described by Pierre Marie in 1886, and appears to be definitely dependent upon an enlargement of the anterior lobe of the pituitary gland. It is evident that diminution of the normal output of the gland or a change in it during the period of growth and development of a child

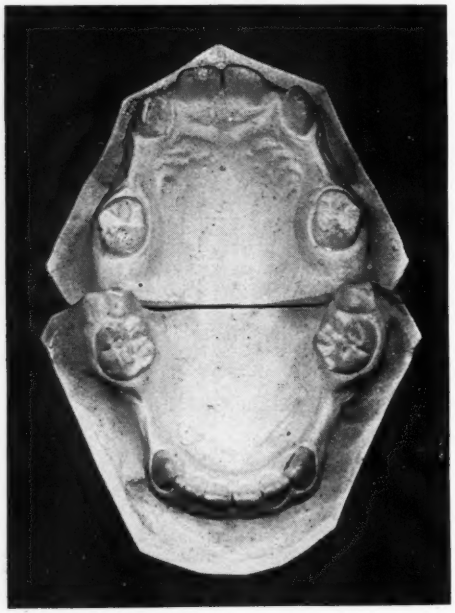

Fig. 5.—Models of jaw of patient 14 years of age with no premolars or first permanent molars. Undeveloped mandible and maxillae.

would be manifested by lack of growth of the skeletal structure. If this be true, then it would seem that this might be a factor worthy of consideration in our investigation of the different factors influencing growth and development of the maxillary bones.

I believe that in every case where there has been interference from any source with the normal development and growth of the mandible there will be serious difficulties present in the development and eruption of the mandibular third molar. In order then for us to obtain a clear conception of the conditions under which the mandibular third molar develops and erupts, let us review briefly the growth and development of the mandible from the standpoint of stimulation.

The outer and inner cortical plates of the mandible are its supporting structure. According to Cryer it grows by an interstitial process, each half

having three fixed points between which the growth occurs, namely, the ramus, the mental foramen, and the symphysis. The periods of growth in these regions seem to correspond with the time of the development and the eruption of the teeth of the localities concerned. Thus the increase between the mental foramen and the symphysis occurs during the time the incisor, canine, and deciduous molars are developing. After these teeth are erupted, there seems to be little further increase in the length of this portion of the jaw at this time. Thus the growth of the child's jaw seems completed with the eruption of the last deciduous molar. From this time on, until about the sixth year the growth anteriorly-posteriorly is less rapid. (Fig. 5.) However, about the fifth year the second stage in the lengthening of the jaw from the mental foramen to the ramus seems to begin. Space is provided by the lengthening of this area for the first permanent molar, and forward growth continues until about the twelfth year when the second permanent molar erupts, and then the growth anteriorily seems to be less rapid for the accommodation of the third molar. The cancellous portion of the bone grows forward as the supporting structure increases in length. At the same time the jaw is lengthening and widening between the mental foramen and the angle of the jaw, a less noticeable increase is taking place anterior to the mental foramen through the stimulation of the development and eruption of the permanent incisors, canines and the premolars. Therefore, by the sixteenth or seventeenth years under normal conditions there should be sufficient space provided in the mandible for the normal placement of the sixteen teeth. However, in many individuals we do not have this normal physiologic phenomena going on uninterrupted from birth to the sixteenth or seventeenth year.

Quoting from Noyes, he says, "In all the process of development the growth is the result of all the forces to which the bones are subjected, perfectly distributed through the substance of the bone by the agency of normal occlusion. Any lack of harmony in the proportion of these forces may allow the teeth to meet, where they erupt outside of the normal influence of their cusps, causing the beginning of malocclusion. Any malocclusion disturbs the balance in the distribution of forces and results in the disturbance in the development of bone, which progresses during the entire period of development." The normal proportion of all of these forces may be changed by varying conditions. The stimulation to the developing bone through the periosteum by muscular activity may not be in proper balance with that which is going on inside of the bone, by the development and eruption of the teeth. In such cases the forces would be unequally distributed and the development of the mandible would be retarded.

Then again, changes may occur within the developing bone itself through the process of inflammation that will interfere greatly in the normal eruption of the teeth. Inflammation within the mandible caused by diseased teeth or by constitutional disturbances may completely change the character of both the cancellated and cortical portions by stimulating the bone building cells of these tissues to undue activity. Under such conditions there seems to be a

hyperplastic change taking place in which the cancellated bone becomes dense and hard taking on a condition resembling cortical bone. This is brought about by an over stimulation of the bone cells which results in the deposit of secondary bone being laid down within the cancellated tissue. It does not take any great stressing of the imagination to realize how such a condition would affect the balance of force in the development of the mandible, especially when the condition occurs in the jaws of children. In such cases when the time arrives for the eruption of the third molar the cancellated tissue is so dense that its normal eruption would be impossible, and the disturbance caused earlier by the pathologic condition would have so influenced the progress of bone development that it is not probable that sufficient space for the tooth would have been provided. Cryer states "that many cases of impactions of the mandibular third are doubtless due to the existence of such conditions."

Fig. 6.—Mandibular third molar developing in angle of jaw.

He says further "that among the general pathologic disturbances which may bring about deformity or retarded eruptions of the teeth may be mentioned syphilis, the acute exanthemata such as scarlet fever, etc., and disorders of nutrition. Chronic conditions resulting from any of the acute exanthemata may interfere with the proper development by causing an excessive deposit of salts of calcium inducing a hyperplasia which may be either general or localized within the cancellated bone."

Thus we can see how numerous are the factors which may influence the harmony in the proportion of the forces which are necessary in the normal development of the bone during the period of childhood and adolescence. It is thought by some writers that the growth of the jaws anteriorly is about completed by the twelfth year when the second molar has completed its eruption. It is my opinion that so long as there is a stimulation set up by an erupting tooth there is still a multiplication of cells going on in the bone, therefore I think that the complete cessation of growth does not take place so long

as a third molar is in the process of eruption. These teeth do not have the same opportunity for normal eruption as do their fellows, for the reason that they are developing in an area of denser bone. The germ develops in the angle of the jaw and is surrounded by denser tissue throughout its whole process of development and eruption. (Fig. 6.) Under these conditions the tooth in pressing forward takes a course in which the least resistance is offered and many times it encroaches upon the second molar. Many beautifully orthodontic results have been ruined, as a result of this condition. All of the teeth in the lower arch seem to change position. We see in this a clinical picture; as to just what actually occurs to cause all of the teeth in the arch to change their position the writer's mind is somewhat hazy.

It is the common thought that the third molar in its endeavor to erupt actually forces all of the lower teeth forward, and any effort on the part of

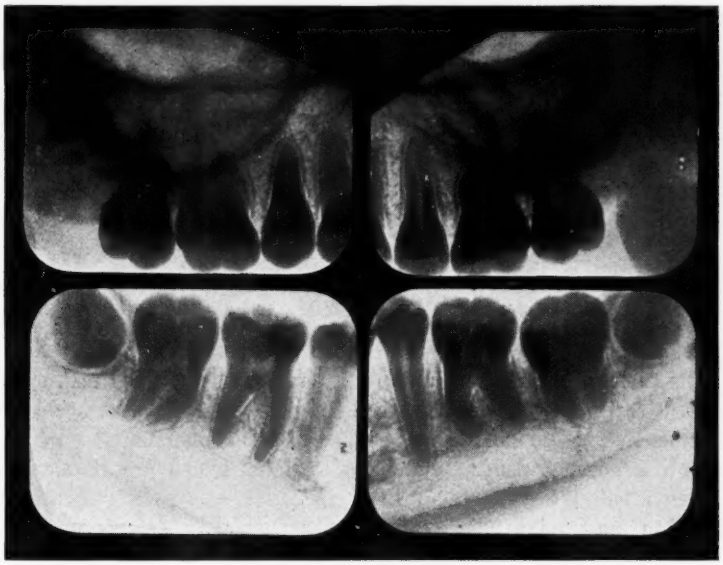

Fig. 7.—Patient 16 years of age, had orthodontic treatment beginning 4 years ago, teeth now moving out of alignment, third molars not in contact with second molars.

the orthodontist to retain the teeth in alignment at this time is apparently made in vain, until the removal of the offending third molar. Yet in certain cases we are able to see the teeth at the age of fifteen or sixteen years drifting out of normal alignment when there is no contact between the second and third molars. (Fig. 7.) I am of the opinion that there is another factor, or perhaps more than one, that must be considered in the etiology of this condition. If it be true that forward growth of the mandible is made possible by stimulation of the bone cells, through the development of the teeth as one of the factors, is it not possible then that in these cases there is a forward growth and development of the bone in the region of the third molar which gradually forces the whole mandible forward? This allows the teeth of the mandible to meet those of the maxillae outside of the influence of their cusps, causing the teeth of both maxillae and mandible to be forced away from their normal position. Though the third molars in the maxillae may be erupt-

ing at the same time there exists an entirely different condition in the character of the two bones in which the teeth are developing. The stimulating forces acting on the development of the bones of the mandible and maxillae at this time are possibly unequalized so that the forward growth of the two bones does not take place in unison. May the position of the maxillary teeth at this time not influence the movement of the mandibular teeth out of normal position? Does it seem probable that at the age of fourteen or fifteen there could be sufficient force exerted by the developing third molars with their crowns little more than calcified and with their roots still in the process of development to cause the movement of the whole mandibular arch? Yet we have seen beautiful orthodontic results destroyed at that time.

In closing I wish to say that I believe in the light of our present knowledge no dogmatic statements can be made regarding just what all of the influences are that disturb occlusion at the time of the eruption of the mandibular third molars, and that further studies on this interesting subject should be made.

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[3]Cryer: Internal Anatomy of the Face.
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DISCUSSION

Dr. Joseph D. Eby.—It was my privilege to participate in the discussion of a paper read by Dr. Lyons in New York recently and at that time I deferred making a statement of some thoughts and feelings which I have had in my mind and heart concerning him. I am very happy now that I did not do so because of this opportunity, and if you will bear with me for a few minutes I will submit these thoughts which are worthy of record. For many years before I had the pleasure of knowing Dr. Lyons personally his reputation had brought to me those most admirable qualities reflecting both fundamental ability, as well as the finest personality which characterizes the ideal and unselfish professional man.

During the dark days in the fall of 1917 when we were engrossed with many serious army problems at Camp Sherman, Ohio, it was determined that Dr. Lyons could be of great service if he would come and spend some time with us. His response was immediate, and the manner in which he administered to our needs not only fulfilled our wishes, but the inspiration which we all received from him was felt not only in that camp but was carried wherever those members of the Dental Corps served afterwards. In the spring of 1918, when the dental school was established at Camp Greenleaf the problems of preparing the men who attended that school for the oral surgical work was so great that none of us felt equal to the responsibility, so we again telegraphed Dr. Lyons to come all the way down there at his own expense for the purpose of laying the foundation of our courses. True to our expectations, he came, and remained for several days, during which time he lectured constantly, morning, afternoon and evening on every conceivable phase of oral surgery.

Every time I have ever heard him speak he has always woven his thoughts with that careful, progressive, sound reasoning that proves the consistency of his thoughts, and the pursuit of his characteristic policy of unselfish, conscientious, hard work well done. This is a glorious opportunity for me to make only a feeble expression, and I hope that God spares him for the strength and value of his continued work, so that his precept may produce more men like him in his field.

Concerning the subject which he has presented to us today, the impression in my mind is, that from an orthodontic standpoint the action and effect of the growth of the third

molars on the development of the mandible is a more or less moot question. It seems that orthodontists possess two or three sets of individual beliefs based on this or that hypothesis, in which they are quite satisfied in their own minds and it seems difficult to clear the truth by any sound reasoning. In the instance of equalizing the occlusion by movement of the mandible from an anterior or posterior position, some orthodontists are perfectly satisfied in their belief that the change occurs in the neck of the condyle and others believe that the change occurs in the region of the angle.

There are numerous phases to consider in the growth and development of the mandible leading up to the age of the presentation of the first molar. Upon studying the horizontal development of the body of the mandible as well as the vertical and horizontal development of the ramus we know that the second deciduous molar occupies the same relation to the external oblique line of the ramus at the age of three years which the normally erupted third molar eventually occupies in the adult. The position from which the six year molar originates and the stimulative phenomena attending the provision of sufficient space for its eruption is largely similar to that of the third molar eventually. If the phenomena of bone growth is a matter of interstitial proliferation the control of growth in the mandible must be influenced in a downward and forward direction by the depressor muscles, in an upward and backward direction by the elevator muscles, aided in both directions by the forces of occlusion and the eruptive forces of each on-coming permanent molar.

In the light of these facts my mind is totally unprepared to believe that the head and neck of the condyles invested in their heavy envelope of elastic connective tissue can undergo much change, and I, therefore, believe that the angle of the jaw is the very active center of growth through the stages of development up to and including the third molars. The impaction of the first and second mandibular molars is exceedingly rare and I believe that this is due to the physical structure as well as the volume of bone and the respective ages when these teeth are presented.

At the advanced age of the third molar, however, the increased volume and density of the mandible has reached the stage where the balance of forces has become more or less established so that the resistance offered to the erupting third molar is frequently greater than its own developmental and eruptive stimulus can overcome.

Under these conditions it becomes easier for the third molar to complete its development in an impacted position by the displacement of the more cancellous bone immediately surrounding it. This situation brings up the observation of the fact that the recognized processes of evolution and environment must necessarily be taken into account. I am firmly convinced of the fact that if the mandibular third molars erupt at the normal age and in normal positions a very complex process has been accomplished. If the mandibular third molars fail to erupt normally as a result of the numerous influences about them, I am convinced that any attempts to elevate them orthodontically for function, or to stimulate additional development in the mandible, will be attended with certain liabilities and complications which make that procedure very unreasonable. I am convinced that the stimulating influences of the erupting mandibular third molars, whether they be in normal position or malposed, may have sufficient demoralizing influence as to cause a recurrent malocclusion, or the production of the original conditions of malocclusion. I am convinced that malposed mandibular third molars do not possess the anatomic form, the physical structure, or the general location which would favor the removal of the second molars except in the possibility of the most exceptional cases wherein other local conditions are to be accounted for. I believe that if the mandibular third molars have passed the stage of normal eruption and the provision of adequate space for same, they should be removed, and if the mandible requires additional length horizontally it may better be accomplished by intermaxillary forces or occlusal bite planes judiciously applied.

I wish to congratulate Dr. Lyons on the manner in which he has prepared this subject for our serious consideration, and I trust that every member of the society will give his opinions the serious consideration which they merit.

Dr. Young.—I will show two illustrations which have a bearing on this subject that Dr. Lyons has so beautifully brought before us.

Fig. 1 shows a set of casts of a young man of 20. On the left side notice the pro-

nounced space between the premolar teeth and the premolar and canine in the mandible. There are also spaces on the opposite side of the mouth. Fig. 2, made from a radiogram taken extra-orally of the mandibular third molar area, shows that he has a malposed third molar on the left side, but this molar does not seem to have any influence in pushing the teeth in front of it forward. This is the only case of this kind I have run across.

I have several hundred radiograms taken extra-orally showing development of the mandibular third molar, and I agree with the essayist that when the third molar germ starts back in the angle of the jaw we are almost certain to have a malposed third molar. I

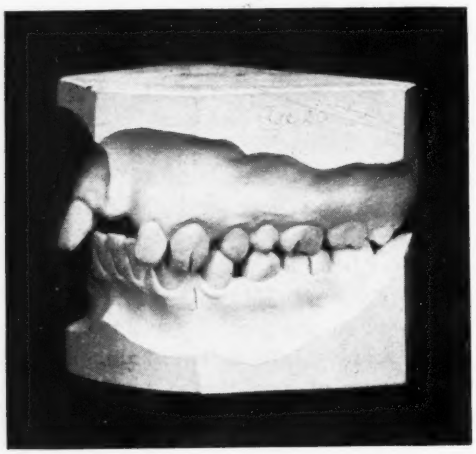


Fig. 1.

Fig. 2.

am of the opinion that the mandibular third molar that erupts in its proper position has been formed in the mandible that has sufficiently developed prior to the beginning of its growth. The earliest age at which I have ever found mandibular third molars developing was seven years.

I think the illustrations that Dr. Lyons has shown here this afternoon prove conclusively that there is something very peculiar about the manner in which these tooth germs become misplaced. He showed a third molar well back in the ramus. Now it is obvious that this tooth germ never drifted there after it formed, but why it formed where it did I do not believe we know. Teeth are found in very unusual positions, not only the

mandibular third molars, but other teeth as well, and I think Dr. Lyons' statement is correct—that he will need ten years to solve the problem for us.

Dr. Varney E. Barnes.—I wish to emphasize what Dr. Lyons and the discussors have said in regard to muscle functioning in its stimulation effect upon bone development. I desire also to oppose that part of the paper which states that the tooth is a factor in jaw development.

Developmental stimulation is produced by muscle stress through the functions of sucking, crying, laughing, frowning, stretching, swallowing, breathing, and mastication. I am speaking of the infant. Studying the development and eruption of teeth, we note that in normals the deciduous incisors and canines have developmental spaces complete at about seven years of age. The deciduous molars exceed the premolars in mesio-distal diameters. This is evidently a natural provision for the eruption of teeth without lateral contact, until after they reach the height of occlusion, and function. Function then adds to the stimulation by means of increased muscle function. The evidence of the tooth cusps is that they

Fig. 1.—Illustrating development of mandible independent of teeth.

seem to be designed to pierce the gums, and thus permit a continuous ring of gum tissue to constrict about the smaller cervical margins. Later comes the lateral contact.

From the above I have had to conclude that the teeth are not much of a factor, if any, in bone development until after they function in mastication. That is through muscle function, which is indirect. In support of this I submit photographs of a case in which the second and third molars are missing on the right side of the mandible; all the other teeth are present. Measurements taken from the angle of the mandible to the symphysis on either side *are equal.* (Fig. 1, Photographs. Fig. 2, Radiographs.) This seems to be good evidence that the teeth are not factors in jaw development until after they function through muscle action. The prevalence of dental abnormalities and malocclusions is good evidence that the pressure stimulation of teeth developing and trying to erupt is not a factor to be relied upon in bone development.

Central, laterals, canines and first molars are developed to full mesio-distal diameters at about four years of age. Fig. 3 illustrates crown development as shown by Peirce from Cosmos, in 1884. At four years of age we have the complete mesio-distal diameters of cen-

tral, laterals, canines and the first molars. That is significant. (Ages are approximate, of course.) Including developmental spaces, the width of the jaw is complete at or before seven years of age. Then there is the development of the deciduous molars which maintain the

Fig. 2. Right.

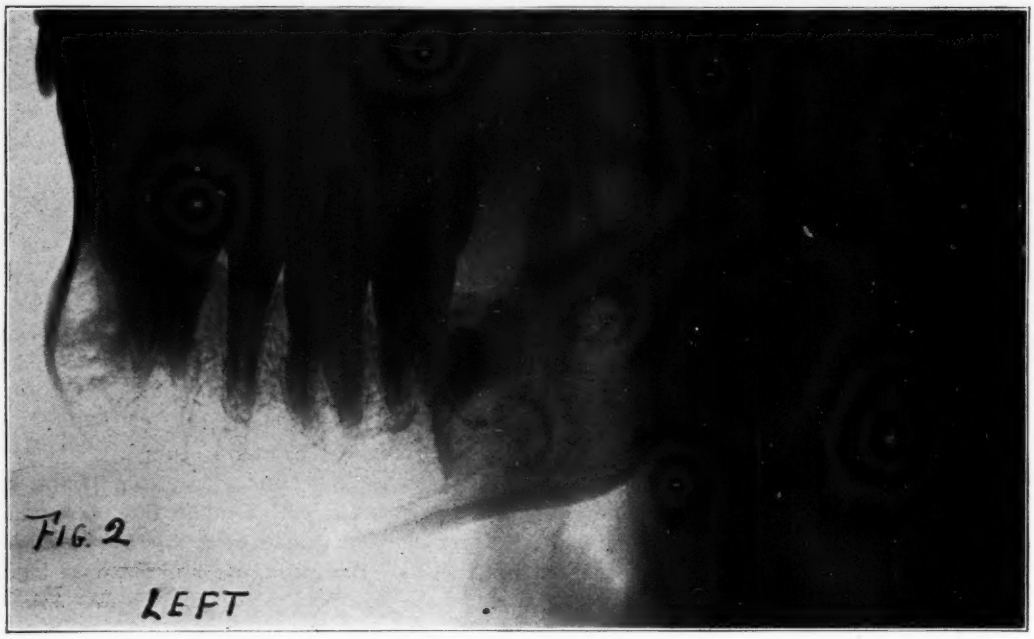


Fig. 2. Left.

Fig. 2.—Right and Left. Illustrating development of mandible independent of teeth.

anterior-posterior dimension. There is no more need for an anterior-posterior or width development anterior to first molars after that time. The development that then goes on is at the angle of the mandible and in the corresponding place in the maxilla, where the first molar, the second molar and the third molar develop in turn. If we reason in this manner

we are not going to think of teeth acting as a stimulus in development; we are going to think of the development of the bone being first, and then the teeth erupting, as Dr. Young stated. I have made that statement before, and I think the evidence is all in that direction and against development by tooth stimulation.

Bone development first provides the developmental spaces to permit normal tooth eruption. The width development of the dental arch is complete back to and including the first molars at or before seven years of age. The vertical and anterior-posterior developments are not complete until maturity, hence the development we may expect in the mandible and maxilla is posterior to the first molar, and it would seem absurd to think that the entire dental structure is pushed forward normally by the oncoming second and third molars.

Fig. 3.—Illustrating development of tooth crowns. (From Pierce, Cosmos, 1884.)

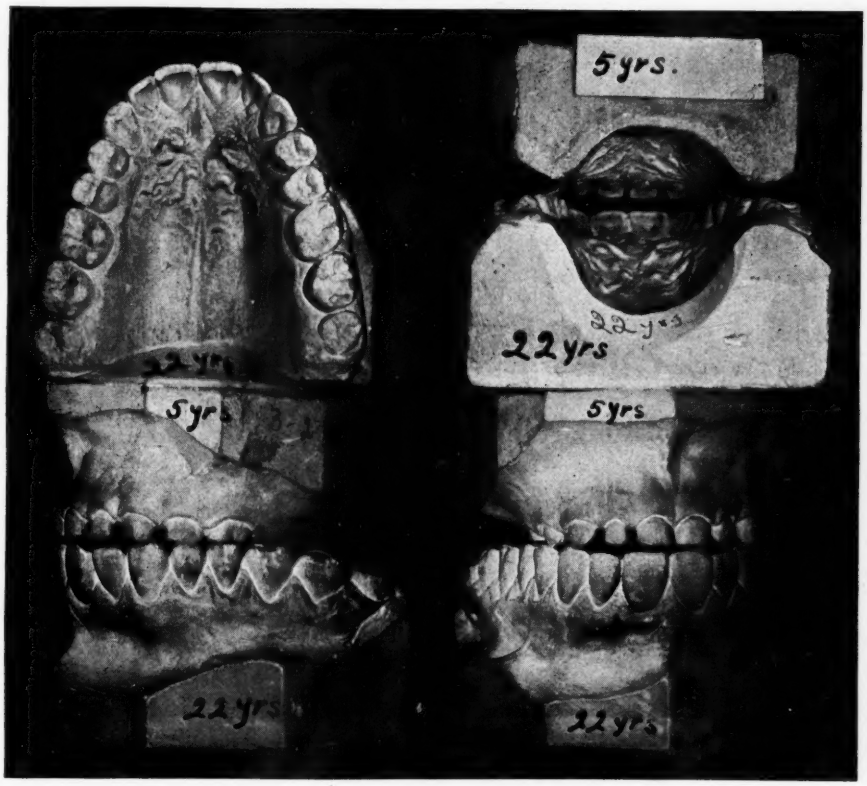


Fig. 4.—Illustrating width development complete at early age. Bone development independent of tooth stimulation.

The entire structure does undoubtedly move forward or develop forward, but it must be by a stress other than that of developing teeth.

I want to call attention to two cases, I have shown before. (Fig. 4.) One a child five years of age, showing developmental spaces, and the other below is that of an adult twenty-two years of age. Notice the singular relation in the width development in those two cases. The permanent teeth in both cases were practically same size. Notice the difference in the vertical depth of the arch in the adult and in the child. Note the side view of the child and of the adult. This is partial proof of the width development complete at a very early age.

Fig. 1 shows the case in which the second and third molars on the right side are miss-

ing. I measured with a compass from the angle of the jaw to the symphysis on both sides, the measures were exactly the same. I think you will note that the face is fairly symmetrical, but that the mandible has developed without the teeth. The teeth were not a factor in its development. The bone must be developed first for the teeth. Reasoning back this shows that we have deformities of the jaw and deformities of the teeth, malocclusions, irregularities, because the bone did not develop enough. Why do we have these impactions? I tried to define impaction in 1911 in this fashion, that impaction was the resistance met by teeth in endeavoring to erupt. That resistance was against other teeth, bone, or over-resistive tissue, or abnormal tissue.

Dr. Lyons (closing).—It was very hard for me to sit still and listen to the eulogy that Dr. Eby gave me. I hope I will prove worthy in the future of the fine things he has said of me.

I wish to thank the men that have discussed the paper and to say, as I said before, that it is going to take a good many years, in my judgment, for some of these questions to be settled. At the present time I am not yet ready to concede to Dr. Barnes that the teeth have nothing to do with the development of the jaws. We all know that bone develops by any stimulation; I don't mean irritation, but stimulation. I am not yet ready to give up the great work of Noyes, Cryer, Hopewell Smith, Huber, and a dozen others that I might mention, until this has been proved.

I tried to show two cases which, in my judgment, did not go on to normal development because of lack of stimulation of developing teeth. Dr. Barnes has showed three cases in which he feels that the jaw developed regardless of the teeth. If we could have a thousand cases of this kind then we would get somewhere, and until we have an abundance of evidence I still will have to retain the feeling that the teeth are one of the factors in the development of the jaws. I will not take up any more time, and I want to thank you again for this courtesy.

AN EFFICIENT RECORD SYSTEM*

By C. W. B. Wheeler, New York City

At St. Louis, in 1919, I presented a paper before this Society on the subject of records, and tried to give my idea and plan of carrying out this work. I had been investigating methods for a long time, getting ideas from everywhere, and trying to improve and make them applicable in the office. A number of changes have been made which have proved of such benefit to me, that I could not refrain from bringing the matter before you. There are only two points I wish to emphasize and they are: simplicity and the saving of time.

In order to keep orthodontic records, have them accurate and cover all the facts desired, we must plan our system, so there is just as little effort exerted as possible, or there will be a tendency to slight the work when we are busy in other lines. There is still room for improvement and I shall go on trying to eliminate every false move.

The records are divided as follows:

1. Consultation cards.
2. A simple loose leaf ledger.
3. A five by seven envelope, with three cards enclosed.
4. Address book.

The consultation card is used for all patients, who call to consult in regard to what can be done, time, etc. On this card is placed all the data as well as the fee and estimated time of treatment. It is well to make a note of any accidents the patients may have had in the past, where the teeth have received a blow or been injured, etc. The statement about such matters is readily given by the patient at this time. After the movement of the teeth commences, should trouble occur, it is sometimes difficult to get a statement in regard to a previous injury. (Fig. 1.)

The ledger will need very little description as it is the usual kind that is familiar to all. At the top of the page is given data that will help in sending bills. Below are the customary debits and credits. (Fig. 2.)

In the back of the ledger, the first of each month, the operator makes out a list of the patients to whom bills are to be sent and the amount. That is all he has to do with this part of the work. This seems necessary, because only he knows the condition of the patient's mouth and the amount of work that has been accomplished. Upon payment of these bills, either by check or cash, it is entered on the opposite page. With the checks, the maker's name is given, the amount, date, number and the bank upon which it is drawn. This gives a complete record. (Fig. 3.) If an inquiry arises at any

*Read before The American Society of Orthodontists, Chicago, Ill., April 9-11, 1923.

time, all this data can be given. It often settles a question in itself when it is known that an accurate business-like method of keeping account of all checks is observed. From this list at the end of the month, or any time, the

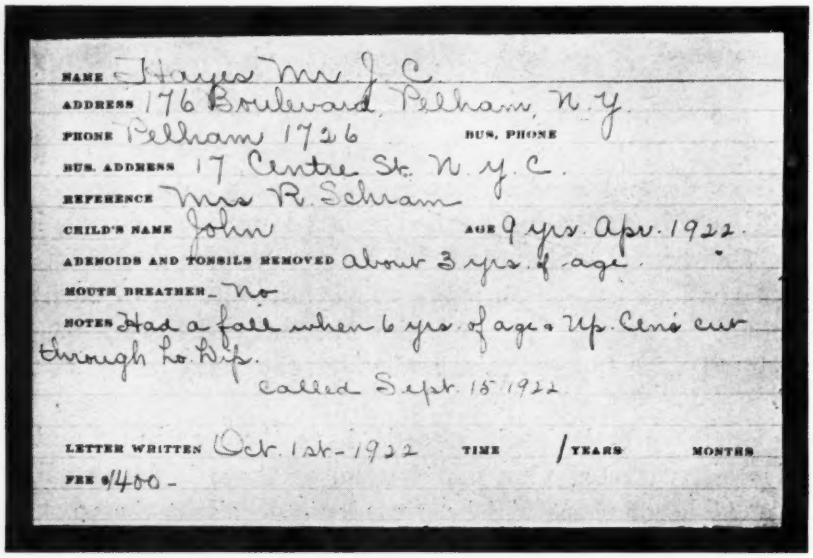

NAME Hayes Mr. J. C.
ADDRESS 176 Boulevard, Pelham, N.Y.
PHONE Pelham 1726 BUS. PHONE
BUS. ADDRESS 17 Centre St. N.Y.C.
REFERENCE Mrs R. Schram
CHILD'S NAME John AGE 9 yrs. Apr. 1922.
ADENOIDS AND TONSILS REMOVED about 3 yrs. of age.
MOUTH BREATHER No
NOTES Had a fall when 6 yrs. of age. Up. Cen's cut through Lo. Lip.
called Sept. 15 1922
LETTER WRITTEN Oct. 1st-1922 TIME / YEARS MONTHS
FEE $/400-

Fig. 1.

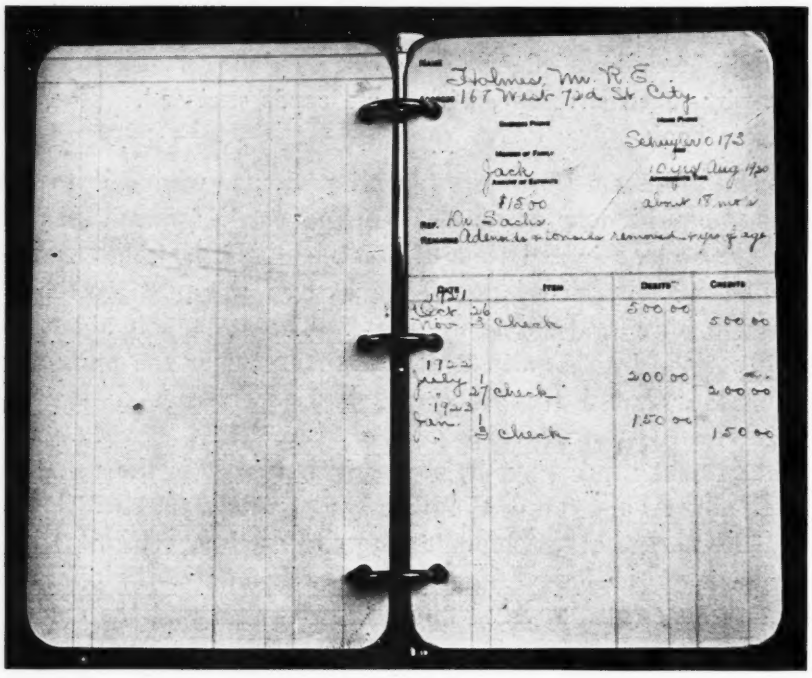

Holmes Mr. R. E.
167 West 72d St. City.
Schuyler 0173
Jack
10 yrs. Aug. 1920
$150.00
about 18 mo's
Dr. Sachs.
Adenoids + tonsils removed 4 yrs of age
1921 Item Debits Credits
Nov 26 Check 500.00 500.00
1922 July 1 Check 200.00 200.00
1923 Jan. 1 Check 150.00 150.00

Fig. 2.

ledger can be posted. I believe it best to keep the financial end separate from other records, as it may be necessary to consult the latter at any time before the dentist, physician or others not interested in the fee.

Record envelopes: on this part of the work I have concentrated most

of my attention trying to make it as simple and efficient as possible. I use a cheap ruled envelope with an opening on the upper right hand corner, where

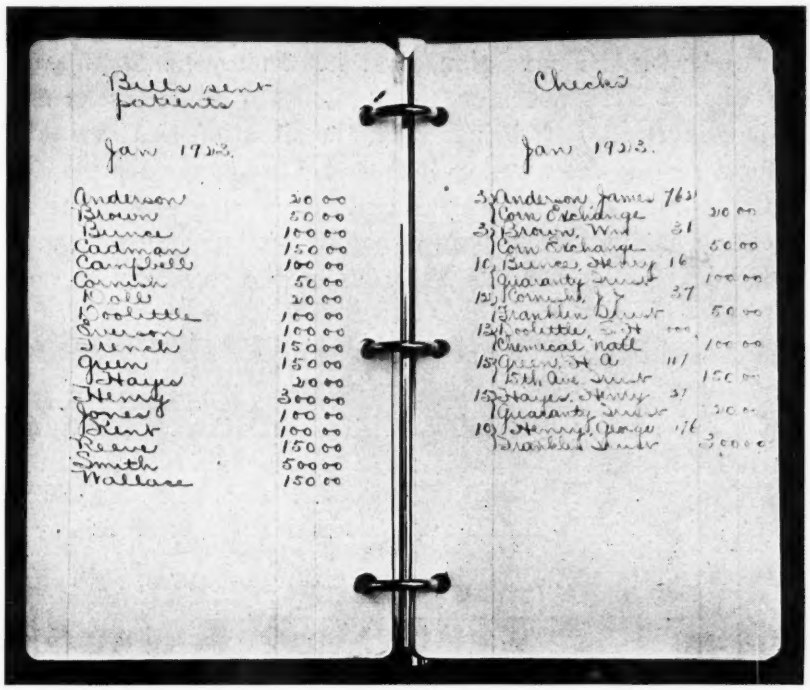


Fig. 3.

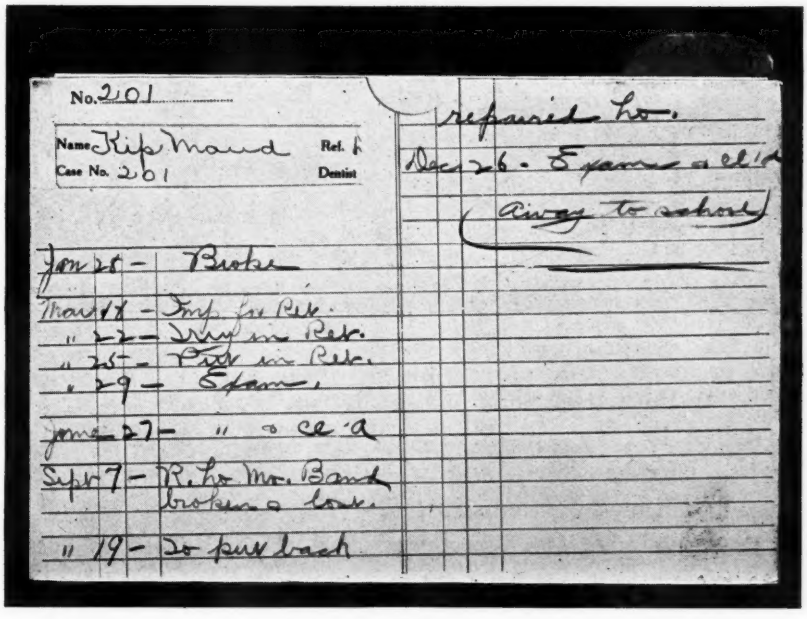
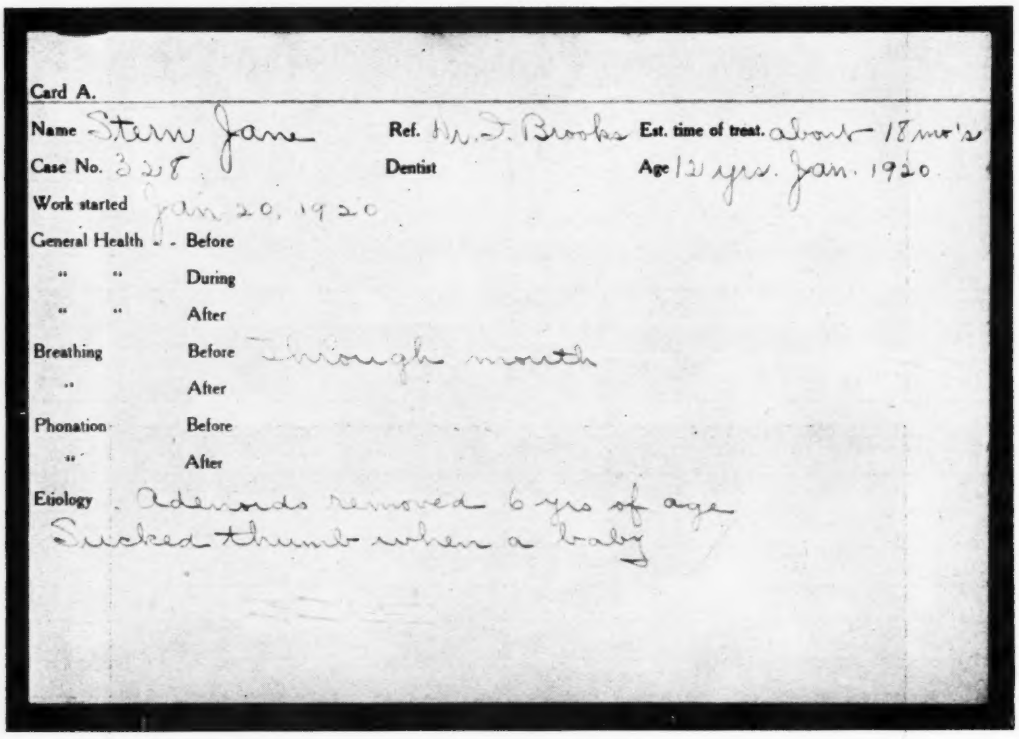

No. 201
Name Kitz Maud
Case No. 201
Dentist
refused Lo.
Jan 26 - Broke
Mar 17 - Imp. for Ret.
" 22 - Imp. in Ret.
" 25 - Pick in Ret.
" 29 - Exam.
June 27 - " & cl. a
Sept 7 - R. Lo Mo. Band broken & lost.
" 19 - 20 pur bach

Fig. 4.

the patient's name appears as it is written on one of the inside cards. There is printed a place for the case number so that there will be no chance of the envelopes getting mixed. They are made inexpensively, so that there is no hesitancy in throwing them away when soiled. The envelope is inscribed

by the orthodontist while the patient is still in the chair. It should show exactly what has been done, also what he believes, at this time, will be necessary to do at the next visit. The latter is written as briefly as possible using only the necessary number of words to bring the idea back to the operator when he next glances at it. In my hands this often saves much time when I have not seen the patient for some weeks and the appointment is a short one. It brings back the situation as I saw it at the last visit, and I can readily see whether it is better to change the plan or carry it through. Of course, the note is often crossed off or erased after it has been used, and only what has really been done left on. This is then marked with the date, and leaves the accurate records for the secretary to enter on the


Card A.

Name Stern Jane — Ref. Dr. S. Brooks — Est. time of treat. about 18 mo's

Case No. 328 — Dentist — Age 12 yrs. Jan. 1920

Work started jan 20, 1920

General Health - - Before

" " During

" " After

Breathing Before through mouth

" After

Phonation Before

" After

Etiology Adenoids removed 6 yrs of age

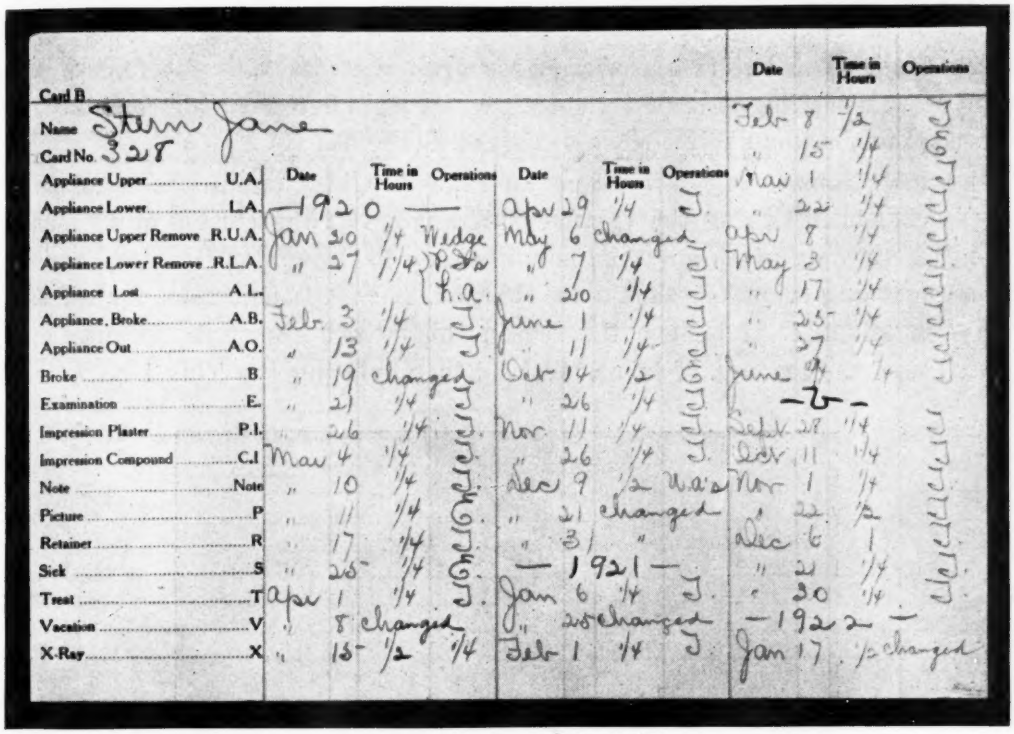
Sucked thumb when a baby

Fig. 5.

inside card after the patient has left, either on the same day or any time in the future when it may seem best. When the envelope is covered with writing or has become soiled, and when everything has been copied, it is thrown away and a new one substituted. (Fig. 4.)

Inside the envelopes are three cards. A, B, C. Card A contains data in regard to the patient, such as when the work was started, who referred them, age, operations, conditions of the mouth, and any other notes that will answer questions that may arise while the patient is in the chair. These facts can be obtained in a moment and often save considerable time and confusion. (Fig. 5.)

Card B gives time consumed in actual work done for the patient in the chair, loss by broken appointments, sickness, vacations, and the nature of



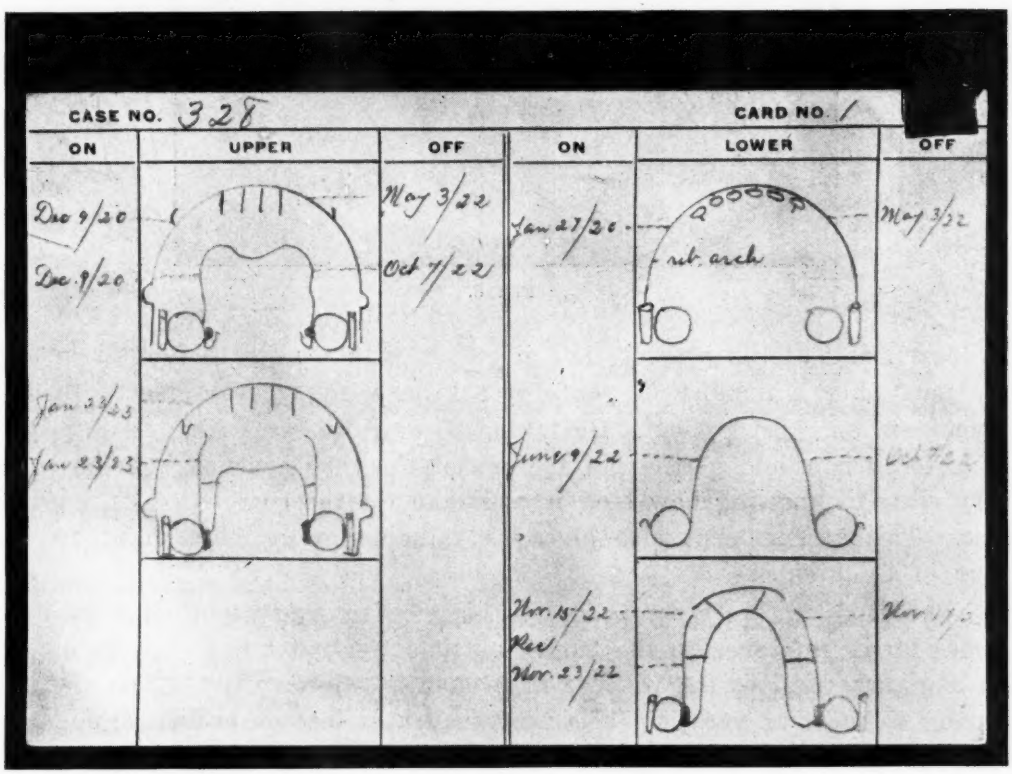
Card B

Name Stern Jane

Card No. 328

		Date	Time in Hours	Operations	Date	Time in Hours	Operations	Date	Time in Hours	Operations
Appliance Upper	U.A.	1920	—		Apr 29	1/4	J.	Feb 8	1/2	
Appliance Lower	L.A.	Jan 20	1/4	Wedge	May 6	changed		" 15	1/4	
Appliance Upper Remove	R.U.A.	" 27	1/4	P. Ja	" 7	1/4		Mar 1	1/4	
Appliance Lower Remove	R.L.A.			f.a.	" 20	1/4		" 22	1/4	
Appliance Lost	A.L.	Feb 3	1/4	J.	June 1	1/4		Apr 8	1/4	
Appliance Broke	A.B.	" 13	1/4		" 11	1/4		May 3	1/4	
Appliance Out	A.O.	" 19	changed		Oct 14	1/2		" 17	1/4	
Broke	B	" 21	1/4		" 26	1/4		" 25	1/4	
Examination	E.	" 26	1/4		Nov 11	1/4		" 27	1/4	
Impression Plaster	P.I.	Mar 4	1/4		" 26	1/4		June 24	1/4	
Impression Compound	C.I.	" 10	1/4		Dec 9	1/2 U.a's		— 1921 —		
Note	Note	" 11	1/4		" 21	changed		Feb 28	1/4	
Picture	P	" 17	1/4		" 31	"		Oct 11	1/4	
Retainer	R	" 25	1/4		— 1921 —			Nov 1	1/4	
Sick	S	Apr 1	1/4		Jan 6	1/4	J.	" 22	1/2	
Treat	T	" 8	changed		" 25	changed		Dec 6	1	
Vacation	V	" 15	1/2	1/4	Feb 1	1/4	J.	" 21	1/4	
X-Ray	X							" 30	1/4	
								— 1922 —		
								Jan 17	1/2 changed	

Fig. 6.



CASE NO. 328 CARD NO. 1

ON	UPPER	OFF	ON	LOWER	OFF
Dec 9/20		May 3/22	Jan 27/20		May 3/22
Dec. 9/20		Oct 7/22		rt. arch	
Jan 23/23			June 9/22		Oct 7/22
Jan 23/23					
			Nov. 15/22 Rec Nov. 23/22		Nov 17/2

Fig. 7.

the operations performed. On the left of the card are printed a number of words with letters and abbreviations after them. They cover all these points fairly well. The letters and words are printed on each card to make sure that anyone making a record would use the right letter or abbreviation, so there would be less likelihood of a mistake. (Fig. 6.)

I have found very few men who have any idea about the number of hours consumed during the treatment of anyone of the classes of malocclusion. If they do not know this, how are they to draw a satisfactory conclusion regarding what fee should be charged, if the patient asks for an estimate in advance. I believe the reason this is not known is because most men dread the amount of labor involved in tabulating it. This I have tried

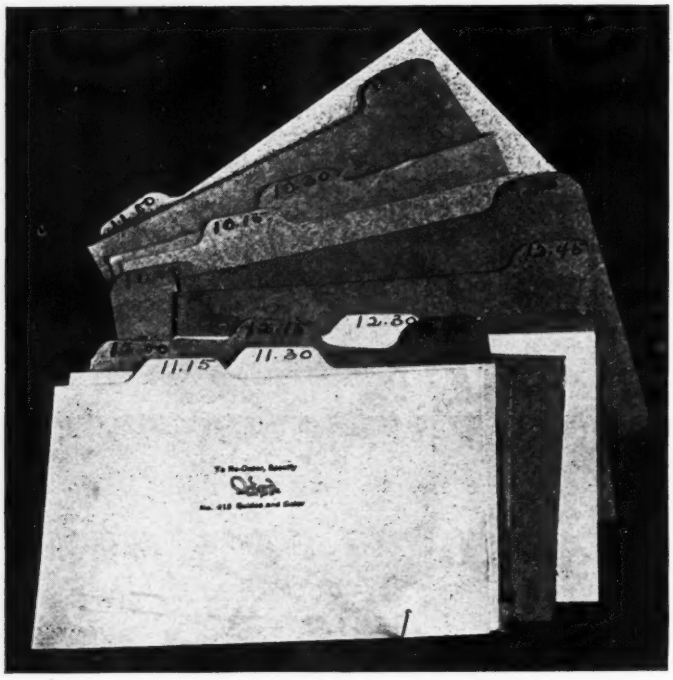


Fig. 8.

to lessen, and at the present time it means with me but a few strokes of the pen. For a number of years past I have an accurate record of the time spent on every patient. By taking 25 or more cases from anyone type of malocclusion, and getting an average of the time consumed, I can come very close to knowing how long it will take for the completion of a given case. This arrangement also gives us valuable information in regard to time of retention.

The cards are very convenient to have before you when some question comes up in reference to the length of time treatment has been going on. At a glance, it gives the number of broken appointments, the loss of time during sickness or vacation, also the number of lost or broken appliances. These facts will often change the opinion of the parents or patients to such an extent, that while before they were inclined to blame you, they will

now give you credit for being patient, and will help to see that the child does better.

Card C is different from anything I have seen and has been of great convenience to me. You will notice that the tab extending out of the envelope has one or more letters on it, which show if there are any x-ray pictures or plans inside or on file. As we are referring to this card more than the others, the tab makes it more convenient to remove. On the card are six spaces marked out for the drawing of six upper and six lower appliances or retainers, six on the front and six on the back. When the work is started, the first appliances are shown by drawings made on the card, and

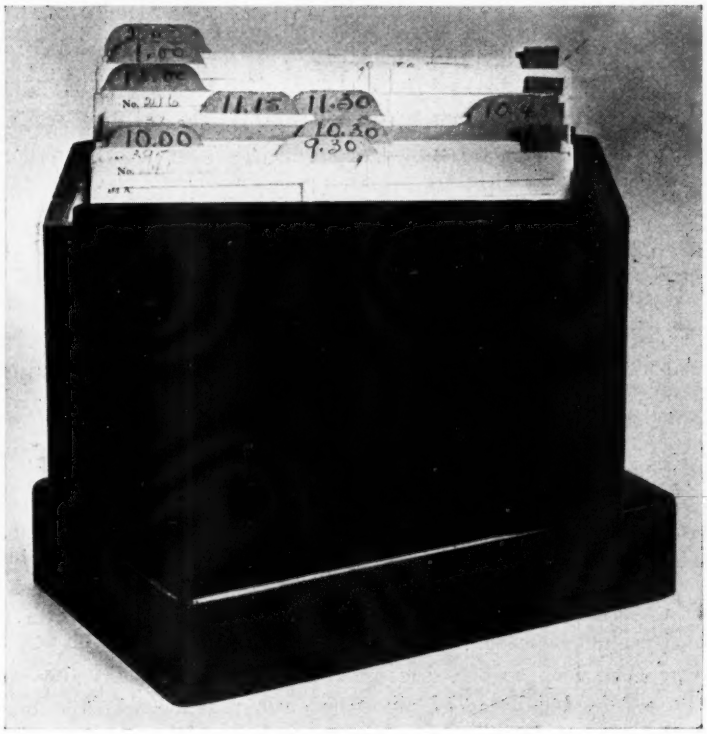


Fig. 9.

the date marked in the column-head with the word "ON." When these appliances are no longer in use and have been removed, the date is noted in the column marked "OFF." The retainers or new appliances are then entered, and when they have served their usefulness it is noted in the "OFF" column again. (Fig. 7.)

Should a patient write or telephone after being away from the office for a long time in regard to a broken appliance, with this card, in a moment's time the whole condition in the mouth as it was at the last visit can be seen at a glance.

With cards C and B before us, we are able to figure out almost anything; time of retention, time of treatment, the number and form of appliances used, as well as the efficiency of each. In a busy practice many things slip your mind, and to me it is embarrassing for the patient to ask

about an x-ray photograph or something else taken months before, find my mind blank on the subject, and get the assistant or secretary to look it up.

I have found that a great many men have their secretary in another room, that it is not convenient to keep in touch with her in regard to the next appointment and the amount of time to be allowed the one in the chair, so they resort to many schemes: such as a second appointment book or a small list made out for the day and slipped in the drawer, etc. To cover this point, I have my secretary take the appointment book and pick out the envelopes of patients coming in the next day. Into these envelopes are slipped index cards with hour on which the patient is coming marked plainly on the extension.—(Fig. 8.) Three sets or more of these cards should be kept on hand with the time marked on them in this manner: 9:00, 9:15, 9:30, 9:45, 10:00, and so on until the closing hour. If they are made up and kept on hand it is an easy matter to slip them into an envelope. Early the next morning, the envelopes with the time cards in place are put in a small file on the operator's table. (Fig. 9.) In this way it can be seen very readily just when each appointment is, and the amount of time that has been allowed. When the patient is seated, the assistant takes the card out of the file and lays it on the table before the operator, and all data is then at hand. As they leave the chair, it is a good idea to mark lightly on the envelope the number of weeks that are to elapse before the next visit, hand the envelope to the patient to give to the secretary, and at a glance she will know when you wish the next appointment.

DISCUSSION

Dr. George Caddick.—We have just listened to a very clear and concise presentation of an efficient system of office records. In the discussion of this paper, one is at a great disadvantage, because any one who is acquainted with the essayist knows that before presenting his subject, he has gone over every detail very carefully and thoroughly. We can but thank him for his courtesy in thus giving us a system which I know he has planned for many hours, and which he has thoroughly and sincerely applied in his own office, to make certain its simplicity and efficiency.

We all know that good records are a necessity in any office, and most will admit that they are one of the bug-bears of an orthodontic practice. If the operator is busy, it seems difficult for him to supply the information necessary to a good record to his secretary, and if not busy, it is only too easily postponed until in a better mood. If the system of records is elaborate, requiring much detail, it is difficult indeed to procure the aid and persistence necessary for efficiency. It is likely that if each of us here made a true confession of his record system, we would find all sorts, good, indifferent and bad, ranging from the most elaborate to those which are kept for the greater part upon the tablets of our memories. All have, at some time or other, felt the urge of a better system of records, and decided upon an improvement. These resolutions, like those of New Year's, are made only to be broken. The well kept, efficient record is a tremendous asset in an office, impressing the patient, or more particularly parent; and being business-like is often the means of settling a misunderstanding or dispute, and is invaluable to the operator for the data which it furnishes.

I have been fortunate that I have, for some time back, been able to use the system as presented by the essayist, and have found it far better than any which I had been able to devise. Like other mortals, I at first found it hard to do even the little I needed to do, at the time when it is best done, namely as the patient is leaving the chair. With a little perseverance, however, it soon becomes a matter of routine. In addition to the records as indicated on the cards, for my own information on the back of Card A, I have made a

transcript of the plan for regulating, as outlined in the original letter to the parent. I have also added what information I could obtain regarding the family history, and facts about the parents' teeth, and so forth. On Card C, I have been in the habit of marking the size of the molar bands, which in case of breakage or loss, enables the proper size to be selected without loss of time.

I would like to ask the essayist if he considers it feasible to divide the cards in the file in compartments—active, retained and finished. Those in the active portion are, of course, in use at each appointment, and might be more readily handled if kept separate. Those kept in the second compartment might well be used as sort of tickler, to keep in mind such as are wearing retainers. Following periodic perusal of these cards, such patients as have not appeared as instructed at the last visit, would be brought to mind, and notice sent them. The fact of notification would at least indicate to the parent that while out of sight, they are not entirely out of mind, thus showing our interest in the case. I would also suggest that in order to facilitate the gathering of data regarding the average time of cases of like conditions, it might be well to add a few blank sheets to the loose leaf ledger. These sheets might be headed as per the different cases of malocclusion, and as each new case appeared the name and number might be listed upon its proper page. It would then be possible readily to select cards for given types of malocclusion, and also show the proportions of the different types. The idea of being able to tell the average time occupied and the ability to set a fee intelligently appeals very strongly.

It is to be presumed that all of us are enthusiastically engrossed in the artistic side of our profession, but it may also be presumed that there is a fair proportion who are of necessity quite interested in the emoluments which may result. From a financial standpoint, therefore, unless we have a fairly accurate idea of the time which a case will take, we are most unbusiness-like. If we wish to be philanthropic, all well and good, but at least let us know what we are doing and to what extent.

In conclusion, I wish to thank the essayist for his inspiration, which I hope will be sufficient to enliven our jaded, perhaps latent, desires for an easy, efficient system of records.

Dr. Frank A. Delabarre.—This interests me in a very practical way, and I followed it closely, because I believe that records are essential to our progress in treatment. I have taken down several important points which had escaped my notice before. I believe careful records of the time element consumed in these cases are very, very important. I have kept such records myself and at present I am engaged in a resumé of my last ten years' work in all its aspects. I have a list of seventy-two questions that I am going to answer for myself in regard to my own work. In regard to the time element, in the analysis of my records I have found that it takes about twenty per cent of the total time on any case in laboratory work and in study of the cases when the patient is not there. One of the most satisfactory methods in cases where I have to depend upon my own efforts occasionally, or very largely, for my laboratory work is a system of keeping track of my laboratory work. When a patient leaves the chair with the necessity for laboratory work, he is put down on a laboratory list for a certain date when his appliance must be done.

The secretary sees that the models and records of that case are placed on a shelf convenient to the laboratory bench. During any day at any time when I go out to my laboratory with nothing to do until the next patient comes, a matter of five minutes, fifteen minutes, thirty-five minutes, I refer to my laboratory list. I pick up the next case that is not checked off as completed, turn to my shelf, find the box and start to work on that next appliance without the loss of thirty seconds. Without such a system as that in the laboratory I feel that I would be very badly confused and not ready for the patients when they appear.

Of course, you can elaborate these records to the point where they are unwieldy, but they should be practical. I congratulate the essayist on a system that is practical even though it may not be just the system that I want, but I can apply many of his points to my own work.

Dr. Eby.—My experiences, as well as observations, in many phases of dentistry and fields of operation have been so varied as to have given me quite an insight into the matter

of records. My experiences have been that records which are too complicated to be well-kept prove to be very poor, and sometimes as bad or worse than none. Any form of record which amounts to less than a definite system is also exceedingly poor. I have not found many successful men who did not possess at least an adequate record system. The man who has none pays for the situation with his own success. Many successful men are greatly belabored by a too complicated record system. Therefore, I believe the happy, successful man is the one who plans to install a simple but accurate method of recording his work.

During the past two years I have investigated every form of record system which I could find. The essential points about orthodontic records are clinical facts, photographic and radiographic histories, as well as any other special data at the beginning. During the process of treatment the matters of cost of material, direct labor, indirect labor and time spent are all very important. It is on the basis of such records that cost may be accounted, and in time a man may learn by general averages a great deal which he is compelled to know for the future and successful conduct of a growing practice, wherein system and assistance must be installed to meet increasing demands.

Dr. Wheeler showed me his record system exactly as it is installed in his office and I must say that it impressed me as fulfilling the above requisites more simply and perfectly than any other records I have ever seen. So deeply was I impressed, that as a result I have installed his system in my office, and to date have found it to be the most delightful plan which I have ever used. To this end I am not only grateful to Dr. Wheeler, but also was very anxious that he should present this paper for the benefit of the other members of this society.

Dr. Waugh.—I think we have all enjoyed Dr. Wheeler's presentation. I have been impressed with the efficiency and the simplicity of the records which he keeps. I have been to his office and had explained to me there the system described by him today. I think many of us have kept accurate record of the history, treatment and the time in our practices, but I know of no system that has given us the easy way of recording the type of appliance that we have in the mouth, as it has been advocated and used with success by the essayist. A drawing we know, no matter how simply it is made, can portray to the eye knowledge much more quickly than writing can. A student in college can show me more about the histology of a tooth in a simple drawing covering an area an inch or two square than he could by writing me two or three pages. It seems to me that of all this excellent system the outstanding thing that helps me more, or will help me more, than anything else is his method of keeping a record of the appliances he has in the mouth.

Just to cite a practical application, a patient may phone and inform us that something has gone wrong, and by looking at that patient's record card, we can see immediately what appliance is in the child's mouth and can thereby say whether an extra trip to the office is necessary or not. Any change one makes in the appliance can be easily and quickly noted there. Those of us who have associates to assist in our work can plot out an appliance in this way quickly. By having one card and a carbon book system to indicate the appliance by a drawing, the original may be kept in one's own office, and the duplicate go to the associate. By this means, I can transmit in a quick, easy way the type of work that I desire my assistant to do, and then have the record card come back to me where I can easily check up. I think this part of Dr. Wheeler's system commends itself to me as being better than anything that I have seen.

Dr. Varney E. Barnes.—I am very much interested and pleased with what Dr. Wheeler has presented because I have kept a lot of records in a way not at all satisfactory, as we all have, and yet I have felt that I should keep a record which could be flexible, that might be added to as we progress. New things are coming up every year, and we may have to add to our record items which are not provided in a printed record. Therefore, I have adopted, as Dr. Wheeler has adopted, the envelope to hold individual records. I use it to bring together photographs, radiographs, the time records, including every minute spent for the patient, also the financial record so that all may go to the secretary. We have adopted a standard 5 x 8 blank card as being an ideal sized card, a stock card that can always be secured.

We record cavities in the initial examination and as we go along, in order that both

we and the patient may be protected and properly notified. Instead of a pencil record, I use a dictaphone and find it invaluable. I can record on the dictaphone, by grasping the handpiece by the two lower fingers of the right hand, press the starting mechanism with the lower part of the thumb without having washed my hands, and without contaminating the dictaphone contact. I can talk into the dictaphone, record what I want to do the next time, what I have done this time, or what I want to transmit to some other dentist or my associate. I think you will find the dictaphone of inestimable value. The record from the dictaphone is put on a thin sheet of paper, 5 x 8 size, and slipped in with the cards in the envelope.

The doctor made a suggestion about throwing the envelope away. We have tried to develop an envelope which would stand wear. It strikes me that there may be an error in the doctor's use of his temporary record and throwing the envelope away. I believe the first notation on that envelope is the legal record which we would have to produce in court. That is a very vital point to remember. If you throw away your initial record, and you would have to confess that if the point were pressed. I am glad to know Dr. Wheeler keeps a record of time. My assistant records the minutes actually consumed.

I am indebted to Dr. Pullen for a scheme of keeping track of patients coming to the office. Each morning as I arrive at the office I find on my bench next to the operating chair a list of the patients for that day. With that is a list of patients that my associate is handling. A copy is on the secretary's desk, another is on the associate's desk, another is in the hands of the laboratory man, so we all know what is expected of us for that day. The cards in the envelopes with the entire record of the patients for that day are also set before me on the operating bench. Whenever I may have to recall something about a patient, the assistant pulls out the envelope and lays it before me; the record is there and I can pick up details as Dr. DeLabarre has picked up his record. I have enjoyed your records, Dr. Wheeler, and I think I shall profit by them.

Dr. Wheeler (closing).—Gentlemen, I wish to thank you for your kind discussion. With regard to Doctor Caddick's addition to the card, I think it is very good, especially the idea of putting it down at the time the cases are looked over, and the addition of the classification. Should you wish at any time to find out the number of cases of a certain classification under treatment, it would take but a moment's time.

There is no place where these cards can be obtained, as I had them made up for my own personal use. I am sorry there is no other way than to go to your printer and have them made.

In regard to the appointments, I think it is a matter for each of us to work out. By starting with the first hour of the day, and having index cards marked for every fifteen minutes, we can take out any hour that we wish and slip it in the envelope. The work that will take one man one hour, another will do in fifteen minutes, so we have to work out our own plan. We all have the same trouble in regard to the appointments for children. They all want to come in the afternoon or Saturday morning and no other time. It depends on the orthodontist how well he can control this condition.

In regard to what Doctor Barnes said about the envelopes being thrown away, if it comes to a question of law, I would go back to my appointment book. It shows the amount of time consumed by the patient, and even if the time has been changed or broken, we have a complete record.

The appliance card shows the diagram of the appliance made by the assistant at the time it was put in the mouth, or in other words, when it was cemented the drawing was made. It shows the actual appliances, in the mouth when the patient leaves the chair.

NASO-GYMNASTICS

By Dr. E. H. Stanley, Renton, Washington

ALL progress made in dentistry has resulted from the findings of some curious observer. Were it not for these curious observers and their findings, we should be studying Aristotle and the Bible for our dental knowledge. Dentists who have been in practice for twenty years or more can readily recall many changes; a part of them only contributed to real progress. The question has been asked, "What will be the next change in dentistry?"

Dr. George E. Vincent, president of the Rockefeller Foundation, said, "We will soon be paying doctors, as we do lawyers, a retaining fee by the year to prevent sickness in the family." The curious observer asks, "How can prevention be used with regard to the teeth? What about the mouth-breathing child with scab incrusted nostrils? What of those malformations within the nasal chamber which endure through life and make old age an endless torment? What hope is there in medical advice on prevention, should it parallel medical advice given in recent years on dental procedure?" Not to my knowledge has there been advice or direction given by medical men to prevent the widespread and wholesale disfigurement of the faces of the American young. Some accepted authors use the age-old argument that most facial disfigurements come from vicious habits of the individual. I wish to say that nothing is further from the truth. The haphazard growth, which our boasted civilization has so long tolerated, has brought about a huge army of facially disfigured children who demand the services of many specialists at an early age. It is not the congenitally abnormal youngster I have selected to discuss, but the normal, ordinary child and the conditions of growth to which he is subjected, pointing out the early beginnings of facial distortions, as well as the means of prevention in the majority of cases; an efficient plan of development that puts the correct growth of the face in the realm of the commonplace.

The neglected part of the human anatomy is, and always has been, the face, particularly that portion embraced within a circle which includes the nose and nasal passages—the mouth and throat. It is the development of this part of the face that determines whether the person is to be a one hundred per cent perfect specimen or a degenerate, degeneracy being in this, as in all cases, a deviation or departure from the normal. It is needless to describe the blemishes of the face, they have become so common, but in order to have a clear starting point I will say that facial blemishes, slight or well advanced, are well nigh universal. Those which cannot escape ordinary attention are: crooked teeth, crooked noses, odd-sized nostrils, deviated nasal septum, the face with the adenoid look, pinched or undeveloped

faces, with a one-sided cast, one large and one small nostril, and the accompanying evils which the derangement of these parts is sure to produce.

In an orthodontic practice extending over twenty years, I have examined over ten thousand children with irregular teeth. In each case where teeth were malformed in any way, the nasal passages were also misshaped and always unhealthy; breathing was difficult through one of the passages which was more or less scab incrusted and inflamed. Parental history runs somewhat as follows: "I don't see why Jimmy is in the condition he is; I have had his adenoids and his tonsils removed; he has the best of nourishment and care, and he still looks like a fright." I recall one small youngster, who had gone through the whole gamut of removals before becoming a patient of mine for orthodontia. While in the bath he discovered his shoulder blade and asked his mother what it was. She laughed when she told me that he begged her not to have that cut out also.

The above sounds like exaggeration, but compare my statement with that of Dr. Cryer, of Philadelphia, who is said to have examined over 20,000 skulls of the white race to find less than one per cent with straight teeth and without nasal deviation. When Dr. Willard Flint was president of the American Society of Orthodontists, in his annual address he begged that something be done for the poor—for the masses. He himself felt inadequate to meet the growing situation with so many demanding services; the task was far beyond his capacity. In reply to a letter of mine an army general said: "If deviation of the nasal septum disqualified the soldier the American army would be mighty small." Dr. G. V. I. Brown, of Milwaukee, some years ago advocated the use of powerful jack-screws attached to the premolars to widen the dental arch, so that more and adequate space might be obtained for the nasal passages. While the scheme was not accepted as practical, I mention it as he recognized the great necessity of space and freedom within the nasal cavity.

"What is exercise? What does it mean?" The answer is the use of anything, be it mental or physical. We all know that if we failed to use one of our arms, put it in a sling without use, it would waste away, and the other one would grow stronger. The same would be true of one of our legs, and that is true of all of our organs. The use of an organ by exercise, if that exercise is within the bounds of reason governed by good judgment and intelligence, will make it stronger. If we do not use our organs or exercise, we become subnormal, weak, a fertile field for the germs of disease. (Wm. Muldune.)

There is no part of the human anatomy where prophylaxis or prevention is so easily applied, and with such gratifying results as to that part embracing the teeth and nasal passages, the so-called "vicious circle," which is the despair of the student and the medical man. The nose as a developer of its locality has been underestimated. Naso-gymnastics means nose and exercise—the locality and action. In localities where a cold is unknown, there the perfect facial specimen can be found. It is said that in some parts of Mexico the faces of the people measure up with that exactness that spells

perfect beauty. This is yet to be proved, but in all northern latitudes where colds are common, deviations from the normal are constantly found. The beginning of all deviations of the nasal septum and consequent complications result from a "cold." One of the complications resulting is a swollen and congested mucous membrane of one or both nasal passages. In severe cases it becomes difficult to breathe through the nose, and mouth breathing is forced upon the subject. When conditions clear, nasal breathing is resumed, and the patient is apparently as well as ever. However, the swollen mucous membrane has not been reduced equally in each air passage; one nostril admits air a day, perhaps an hour, in advance of the other and the mischief has begun. The nostril admitting air first is forever the larger.

Cell action, upon which we depend for all structure, is stimulated, let us say, in the left nostril. Like people following a leader all the cells on the left side of the face get into action, and vigorous growth follows from the double air force. The other side, from lack of the tonic effect of air force, remains sluggish. The bending of the bone partition between the nostrils results from this simple process. Unwittingly I managed to make such a condition myself in six weeks' time—but that is another story. The slow bending of the nasal septum is always attended by more or less inflammation, uneasiness and pain; the symptoms are the scab incrusted nostril and the common facial distortions.

Pick up almost any magazine and you will find on its advertising pages "The Daily Dozen Exercises." These exercises have done the bodies of those who take them much good. Let all who become interested in the correct building of the face add another exercise for the face.

Naso-gymnastics: Simply compel the air passages to become equal. We are supposed to be taking the daily dozen. Raise the face of the first child in whom you may note the difference in the size of the nostrils; have him close the larger one by firmly placing the forefinger alongside the nose to exclude its use; also close the mouth, and in that position have him take a sharp run till he pants—panting through the smaller air passage. Rest and repeat. When in doubt about the one to be developed try first one, then the other. But running is absolutely necessary, and also panting. Cell action will thus be stimulated within the unused air passage, and it will not be long before satisfactory results will be apparent. With equal cell action the distribution of building material will be equal. When the one-sided condition is corrected the cell builders are activated, and the more perfect structure can be expected. Thus tooth structure would become more perfect, as well as tooth arrangement, and there would be less tendency to decay if cell action were not interrupted. The small unused air passage would be ample and healthy, instead of a lurking place for disease germs.

Parents with a full understanding of the value of naso-gymnastics need never fear the results of a cold. Warning: The practice of pasting the lips together to compel nose breathing is pernicious, and should never be tolérated.

LOCKS FOR REMOVABLE LINGUAL APPLIANCES*

By Adelbert Fernald, D.M.D., Boston, Mass.

FOR some time I realized the need of lingual locks for removable lingual wires which would not work loose and would be easy to adjust, strong and durable and out of the way of occlusion. I have designed about a dozen different locks and will now show you 4 or 5 that I think contain some new and useful features. Many of you, no doubt, use locks something like the one designed by F. C. Kemple, which has a removable "U"-shaped lock for buccal tubes. (Fig. A.)

Dr. C. W. B. Wheeler also used a buccal sectional tube. (Fig. B.)

Fig. B.—These locks made their appearance about the time of the Angle pin and tube and were designed to eliminate the necessity of using a three piece lingual wire. Dr. Lawrence Baker and probably many others have at some time used different locks so wires could be removed.

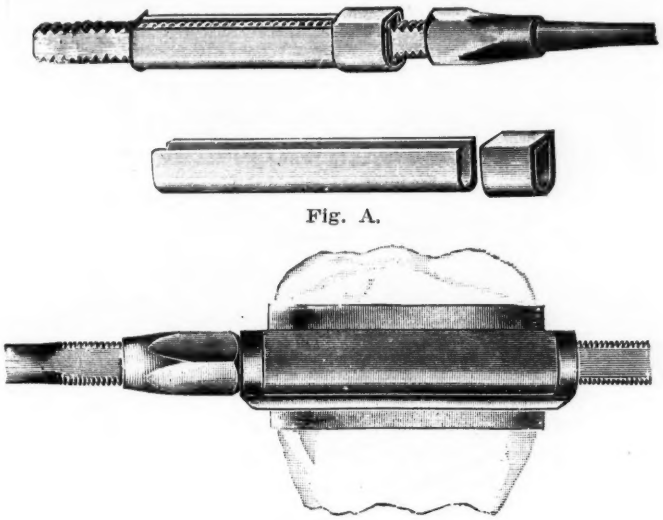


Fig. A.

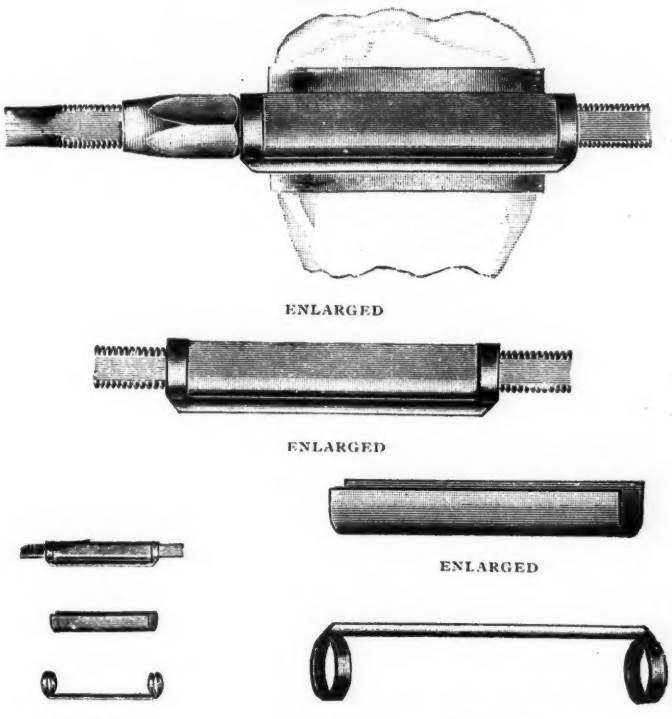


Fig. B.

*Shown before the Alumni Society of the Dewey School of Orthodontia, Chicago, Ill., April 27-28, 1922.

The split tube or cut-away tube (Fig. 1) can be soldered at each end to a piece of contoured band material and then by grinding or cutting through the sectional tube the band is converted into a clamp band. The hollow screw is shown removed and stuck on the top of the band in Figure 1-*A*, can then be inserted and the two portions of the split tube brought together which makes a clamp band very similar in principle to the Luken's band, i.e., the clamping device is on the outside.

The hollow screw bolt has a groove in the nut end which allows the end of the tube to fit into this groove in the nut end of the hollow and thereby locks that end securely while the other end of the tube is held in position by the threads on the hollow screw. This gives a locking device for a clamp band on the buccal surface, if it is desired to use such a band. If the locking screw shown in Fig. 1 is desired to be used on the lingual side of the band in conjunction with the lingual appliance the split or cut-away tube is soldered on the lingual side of the band. By unscrewing the bolt $\frac{1}{16}$ of an inch that end

Fig. 2-*A*. Fig. 1-*A*.

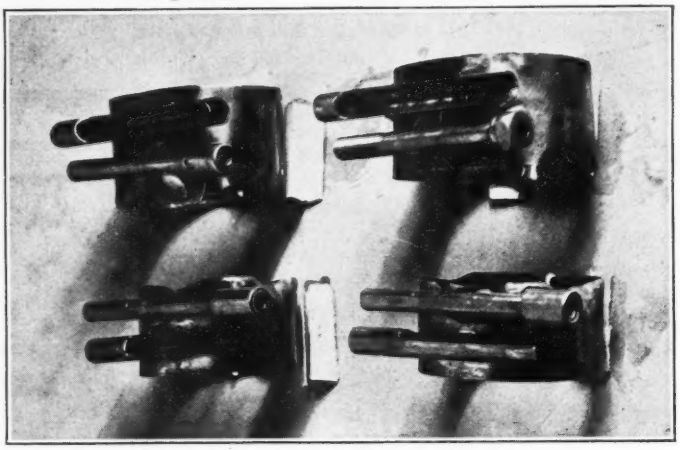


Fig. 3-*A*. Fig. 4-*A*.

of the lingual appliance which is attached inside, the lingual bolt can be removed, from a lock. The lingual wire can be removed from lock by tipping occlusally and withdrawing from the plane tube which is soldered to the molar band on the opposite side.

In Figs. 1-*A*, 3-*A*, 4-*A*, the hollow bolt has been removed and waxed below the cut-away tube to better show construction.

In Fig. 2, the bolt is held in place by a friction catch and bayonet lock, the distal end of the bolt being tapered into place very tightly.

Fig. 2-*A*, shows bolt removed and stuck to band below tube. I discarded this lock as it had to be made right and left although otherwise it possessed good features.

In Fig. 3 the bolt is held in place by a frictional lock at the posterior end made by splitting the section of the tube and bending that part in to fit the notch on the distal end of the bolt, the anterior part of the bolt having a collar extending over the outside of the anterior end of the split tube which is soldered to the band.

Fig. 4 shows lock which is made the same with the exception of oval tube being used.

Fig. 4-*A* shows the bolt removed. The removable part of this lock is held in place by the backward pressure of the appliance as I have a threaded cut on the distal end of lingual arch with the "U"-shaped loop in front of each nut giving me the power of the screw plus the action of the spring from the loops. Where unusual strength is not needed in the appliance, I discarded the removable bolts and used appliance illustrated in Fig. 5. This removable lock has been designed to be used on the lingual side, whether right or left, and

Fig. 4. Fig. 2.

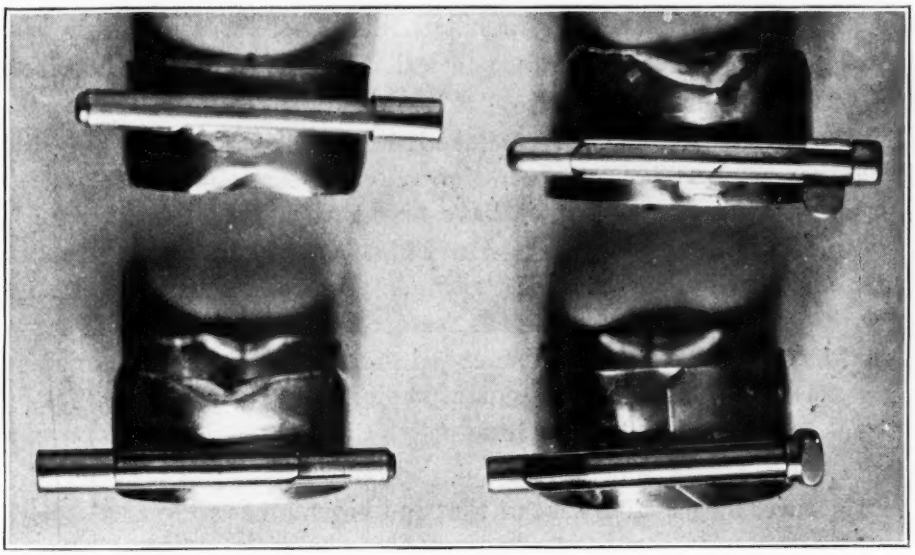


Fig. 3 Fig. 1.

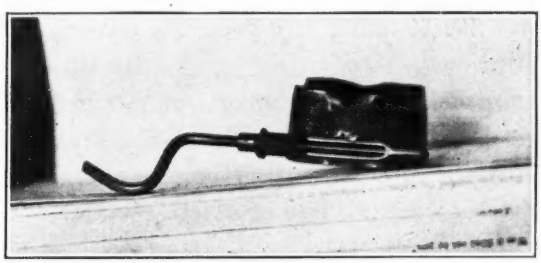


Fig. 5.

can be used equally well on the buccal. It is only necessary to use it on one side at a time, as on the opposite side the plain close-fitting round tube is soldered to the lingual side of the band. By unscrewing the special clamp lock nut $\frac{1}{16}$ of an inch or less, that side of the lingual appliance can be removed and lifted occlusally and the other side withdrawn to replace or adjust one end of the lingual wire into the plane of the tube placing the other side in position and thus tighten with the special nut. These locks will be found especially desirable for those cases where we wish to obtain the action of the thread in connection with the spring force on our lingual appliances.

One end of my clamp nut is divided into four quarters (which does not show in Fig. 5) which spring inward, clamping anterior part of cut-away tube.

REPORT OF COMMITTEE ON DENTAL NOMENCLATURE*

By L. Pierce Anthony, D.D.S., Philadelphia, Pa.
Chairman of the Committee

YOUR Committee begs to report as follows: In the report last year the committee set forth quite explicitly the objects and purposes of the committee, and while we have been criticized for not strictly adhering to our expressed purposes and objects, we feel that on the whole the work of the committee has met with general approval in the profession.

In some of the words we recommended last year it seemed expedient to compromise with a strict interpretation of our declared course, and accept and recommend some words which have found permanent place in our literature by association and long usage, but which do not conform in the strictest sense to the demands of scientific nomenclature. We have not lost sight of the fact that usage is the most potent factor in the development of language, and for that reason we have recommended practically a *status quo* in the case of some words that are possibly not etymologically sound, but whose value and status have already been determined by usage.

For the most part, however, the objections raised have been mostly of a personal nature, by which we mean that individuals have objected to the use of a particular word because of some personal prejudice. And that impels us to repeat what we said in the last report, that personal prejudices will have to be subordinated if we are to make any progress toward the goal of a comprehensive nomenclature.

In this connection we wish to comment on a criticism of the work of the committee offered by the Committee on Nomenclature of the American Institute of Dental Teachers. In commenting on the report offered last year the committee of the Institute says, "The committee empirically states that these complicated terms (the list of words recommended last year) shall supplant the simpler and more commonly used forms," and the said "committee questions the propriety of the publication of any such mandatory list of terms unless the teachers and writers of this country have had an opportunity to express their opinion for or against their adoption."

Your committee disclaims any intention of mandatory action and is fully conscious of the fact that any action by the committee on the question of use of words, even though indorsed by the A. D. A., is subject to the approval of the individual. The committee was not conscious of promulgating an edict under the strong language of "shall"; we merely recommended the use of words as preferable in our minds to those now in use,

*Presented to House of Delegates, American Dental Association, Cleveland, Ohio, September 10, 1923.

with no intention or thought of abrogating to ourselves any compulsory powers.

As to the propriety of publishing a list of words without first approval by the teachers and writers of the country, our definite conviction is that this approval or otherwise will in the nature of the case determine the final adoption of the words into our nomenclature. Conspicuous examples in proof of this assumption are found in the manner in which all previous reports of this nature have been received by the profession. The function of the committee as we see it is in a directive and suggestive capacity—the final status of any and all words to be determined by the usage of dental teachers and writers as well as other members of the profession.

The action of the committee is not intended or desired to be as the laws of the Medes and Persians, and an example of this is furnished in the presentation this year of the word "pedodontia" to take the place of "pediadontia" offered last year. While pediadontia has been in use for some years and has become fairly well established, in deference to the action of the society representing this phase of dentistry, and because of its sounder derivation, we recommend the word they have unanimously adopted to designate the specialty that has to do with the treatment and care of children's teeth.

Much discussion has arisen during the year calling for recommendations on the words "cast," "model," "articulation," and "occlusion."

With regard to the use of "model" in referring to the reproduction of the jaw in plaster or other material, we believe it to be in accord with the broad meaning and use of the term. A model is an object representing something to be made or something already existing; a material pattern of natural size or in miniature.

With regard to "occlusion" we feel that the word is gradually taking the place of articulation, the latter being acknowledged by all to be objectionable and incorrect in referring to the occlusal relations of the teeth. The Committee on Nomenclature of the old American Dental Association, as far back as 1896 recommended the substitution of occlusion for articulation, but it seems to have taken all these years for usage to finally begin to determine its status.

We offer for adoption the word "occlusion" with a more comprehensive definition, and also "articulation," to be used in a more restricted sense.

Some objection has been raised to the termination "clasia" to mean "breaking down," on the ground that the original Greek word "klassis" means to break in the sense of breaking a twig or limb of a tree. This latter is its meaning, but it also means breaking up into parts, as the breaking up of a clod of dirt, and it requires little literary license to allow its use in the sense we have used it. Our own application of the termination we believe to be in accord with its use in the well established words of osteoclasia, osteoclast, odontoclast, etc.

The word "buccal" we recommend to be used only as relating to the cheek, because of the confusion arising in its use in medical nomenclature when applied to the oral cavity as a whole and in dentistry as applied to the surface of teeth according to Black's method of nomenclature.

There has for years existed considerable confusion in designating the inner and outer surfaces of the teeth of the denture as a whole. The word "lingual" adopted some years ago serves the purpose so far as the inner surfaces are concerned, and we recommend the word "facial" to designate the outer surfaces of the teeth of the denture as a whole in preference to the two terms "buccal" and "labial" when used jointly for this purpose.

It is not intended that the word "facial" shall supplant the words "buccal" and "labial" except to designate the buccal and labial surfaces of the teeth collectively.

We would again call attention to the careless use of the term "dead teeth" to designate "pulpless teeth." Recently there appeared in the *Journal of the American Medical Association* an article by a dentist, throughout which he referred to pulpless teeth as "dead" teeth. Dead teeth can have only one meaning to the medical man, and such careless use of terms on our part we believe to be largely responsible for the prevalent attitude of the medical profession toward so-called "dead" teeth.

There are other phases of our nomenclature than the suggested use of words that the committee would call to your attention. We would recommend that the careless method of indicating size by comparison with some commonplace object of indefinite size, such as the size of a hen's egg, a robin's egg, a pea, walnut, etc., be abandoned and size be specifically stated either in the English or metric system of measurement.

We would also recommend the following spelling of the words enumerated: gage, mold, dentin, disk, anesthesia, pyorrhea, septicemia, pyemia, anemia, edema, etc.; in the case of the latter words because of the general tendency to drop the first letter in both the Latin diphthong "æ" and the Greek diphthong "œ," occurring in words other than as the termination.

We would again reiterate our conviction that there is no objection to the adoption and use of words of mixed Latin and Greek origin, in order that we may avail ourselves of the full advantage of these languages as the basis of our terminology; any other attitude would compel the abandonment of hundreds of words now in use and the substitution of new ones that would add materially to the confusion already existing in our nomenclature.

LIST OF WORDS RECOMMENDED

alveolectomy (L. *alveolus* + Gr. *eklome*, excision). Excision of a portion of the alveolar process.

alveolotomy (L. *alveolus* + Gr. *tome, temnein*, to cut). Incision into the alveolus of a tooth, as for locating the end of a root of a tooth.

anesthesia. Preferable to *anæsthesia.*

apicoectomy (L. *apex*, gen. *apicis*, the end (of a tooth root) + Gr. *ektome*, excision). The operation of excising the end of the root of a tooth. To be used in preference to *epectomy; apiectomy; apicectomy.*

articulation. The arrangement of artificial teeth to conform to the requirements of the edentulous space or spaces which they are to occupy and to adequately serve the purposes of the natural organs which they are intended to replace. *Note:* Articulation refers to the actual placing of artificial

teeth, one by one, into the required position; but articulation is not to be used to describe the occlusal relations of artificial teeth after they have been so arranged.

artificial denture. A structure supplying missing natural teeth in whole or in part. To be used in preference to *plate.*

bicuspid. To be used in preference to *premolar.*

bridgework. A partial denture retained by attachments other than clasps.

bridgework, fixed. Partial dentures retained with crowns or inlays cemented to the natural teeth, which are used as abutments.

bridgework, removable. Partial dentures retained by attachments which permit the removal of the denture. Usually the attachment is in two parts, one part being cemented to the natural tooth or its root and the other being a permanent part of the denture.

buccal (adj.) (L. *bucca,* cheek). Relating to the cheek. It is suggested that this word be confined to the above meaning. It is used now incorrectly, principally in medicine, to indicate the *mouth cavity.*

calculus, pl. *calculi* (L.). A stone-like or calcareous concretion formed in any part of the body. To be used in preference to *tartar.*

casting (n. and v.) *Noun*—A metallic object formed in a mold. *Verb*—The act of forming metal in a mold.

cementum. To be used in preference to *cement.*

centric occlusion. Contact of the teeth when the jaws are closed in the position of rest.

cervical (L. *cervix,* neck). To be used in preference to *gingival* as relating to the anatomical neck of the tooth.

clasp denture. A partial denture retained with clasps.

conduction. To be used in preference to *conductive,* as in conduction anesthesia.

cuspid. To be used in preference to *canine.*

deciduous (adj.). To be used as designating the teeth of the nrst dentition, in preference to the terms, *temporary, milk* or *baby.*

dentural (adj.) (L. *dens, dentis,* tooth). Relating to the denture.

dowel. A metal post or pin used in attaching an artificial crown to the root of a natural tooth. To be used in preference to *pivot.*

eccentric occlusion. Contact of the teeth in the excursive movements of the mandible.

endocrinodontia (Gr. *endon,* within + *krinein,* to separate + *odous,* tooth). The study of the internal secretions in their relations to the teeth.

facial (L. *facies,* face). Term to be used to designate the outer surfaces of the teeth collectively.

first molar. To be used in preference to *six-year molar,* or *sixth-year molar.*

fissure. A fault in the surface of a tooth caused by the imperfect joining of the enamel of the different lobes. To be distinguished from a groove or sulcus.

full denture. A structure replacing the full number of natural teeth of both jaws.

functional occlusion. Such contact of the teeth of both jaws as will provide the highest efficiency during all the excursive movements of the jaws which are essential to the function of mastication, without producing trauma.

malocclusion. Such malposition of the teeth as will interfere with the highest efficiency during the excursive movements of the jaws which are essential to the function of mastication. This would not necessarily indicate a lack of occlusal contact when the jaws are closed, nor would it always indicate traumatic occlusion.

mandible (L. *mandibula* from *mandere,* to chew). The lower jaw.

maxilla (L. *maxilla,* jaw). One of the upper jaw bones.

maxillæ (pl.) The upper jaw bones as an anatomical unit, or the upper jaw as opposed to the lower.

maxillary and **mandibular teeth.** Terms to be used, if desired, in referring to the teeth of the upper and lower jaws respectively.

mesial and **distal.** These terms as used today have been objected to as not being in conformity with anatomical nomenclature, where they are used to indicate relation to the median line of the body. They have, however, become so fixed in dental nomenclature that we do not suggest any change.

morsal and **occlusal** (adj.) To be used synonymously as relating to the masticating surfaces of the biscuspid and molar teeth.

normal salt solution. A 5.84 per cent solution of sodium chlorid in distilled water. This should be distinguished from *physiologic salt solution* which is a 0.6 per cent solution of sodium chlorid.

occlusion (L. *occludo,* to close, to shut). The contact of the teeth of both jaws when closed or during those excursive movements of the mandible which are essential to the function of mastication.

occlusal embrasure. The space between the marginal ridges of approximating teeth, mesially and distally, and the point of contact and the occlusal plane.

odontotomy (Gr. *odous,* tooth + *temnein,* to cut). The operation of cutting into the tooth structure.

partial denture. A structure supplying less than the full number of teeth in one jaw.

pathodontia (Gr. *pathos,* disease + *odous,* tooth). That branch of dentistry which has for its purpose the study and treatment of diseases of the teeth.

pathology (Gr. *pathos,* disease + *logos,* treatise). That branch of medical science which treats of morbid conditions, their

causes, symptoms, etc. This term is being used to indicate a disease or pathologic condition, which is confusing, unnecessary, and undesirable.

pedodontia [pe'do-dont-ia] (Gr. *pais, paidos,* combining form *pedo-,* child + *odous,* tooth). That branch of dentistry which has for its purpose the study and treatment of children's teeth. To be used in preference to *pediadontia.*

pedodontist. One who practices pedodontia.

pericementum. The membranous tissue immediately surrounding the cementum of the tooth and between the cementum and the alveolar process. Preferable to *periodontium.*

periclasia (Gr. *peri,* around + *klassis,* breaking [down]. Used as a shortening for convenience of periodontoclasia. Should be used with a qualifying word, as in itself it does not mean anything in particular.

periodontal (Gr. *peri,* around + *odous,* tooth). Relating to the alveolo-dental ligament. To be used in preference to *peridental.*

periodontia (Gr. *peri,* around + *odous* tooth). That branch of dentistry which has for its purpose the study and treatment of diseases occurring around the teeth and their roots.

periodontoclasia (Gr. *peri,* around + *odous,* tooth + *klassis,* a breaking [down]. The destructive degeneration of the tissues about the root of a tooth. Substituted for *pyorrhea alveolaris; Riggs' disease; interstitial gingivitis.*

physiologic salt solution. A 0.6 per cent solution of sodium chlorid in distilled water. This should be distinguished from *normal salt solution,* which is a 5.84 per cent solution of sodium chlorid.

pontic (L. *pous, pontis,* a bridge) (adj. and noun). A substitute for a natural tooth. Used in preference to *dummy.*

prosthesis (n.) (Gr. *pros,* to + *tithenai,* to place). Preferable to *prothesis.* (Because of the more definite application of the Greek preposition *pros,* as compared to *pro,* in this form.)

prosthetics (n.) Preferable to *prothetics.* (For same reason as in prosthesis.)

pulpless tooth. To be used in preference to *"dead tooth," "devital tooth," "devitalized tooth."* In cases where there is a "vital" pulp in a tooth or a "non-vital" pulp, it should be so designated; *e.g.,* a tooth with a vital pulp, or a tooth with a nonvital pulp.

radiogram (n.) (L. *radius,* ray+Gr. *gramma,* a writing). The product or tangible result, as the film or the print thereof of the radiographic process, actuated by radiant energy of whatever source.

radiograph (v.) (L. *radious,* ray + Gr. *graphein,* to write). The act or process of making a radiogram.

radiographer. One skilled in the art of making radiograms.

radiography. The art of making radiograms.

radiology (n.) (L. *radius,* ray + Gr. *logos,* treatise.) The science of radiant energy, to be used as a generic term, to indicate radiant energy from whatever source.

radiolucent (L. *radius,* ray, + *lucere,* to shine). Term applied to substances that allow the passage of radiant energy light, but offer some resistance.

radiopaque (L. *radius,* ray + *opacus,* shady). Term applied to a substance that is impermeable to the various forms of radiant energy.

radioparent (L. *radius,* ray + *parere,* to appear). Term applied to substances that freely transmit the light of radiant energy.

Roentgen ray. To be used in preference to *x-ray,* and only where the specific ray is indicated.

roentgenogram. The shadow picture produced by the Roentgen ray on a sensitized film, or the print from the film.

roentgenograph (v.) The act of making a roentgenogram.

roentgenographer. One skilled in the art of making roentgenograms.

roentgenography. The art of making roentgenograms.

roentgenology. The study and use of the Roentgen ray in its application to medicine and dentistry.

second molar. To be used in preference to *twelve-year molar,* or *twelfth-year molar.*

sialosis (Gr. *sialon,* saliva + *osis,* a condition of). The flow of saliva.

sialotic (adj.). Relating to sialosis.

sulcus, pl. *sulci* (L.). A long shaped depression in the surface of a tooth, the inclines of which meet at an angle.

third molar. To be used in preference to *wisdom tooth.*

traumatic occlusion. Such contact of the teeth of both jaws as would induce trauma during centric or eccentric occlusion, because of malposition of the teeth or disarrangement of the occlusal planes.

Vincent's infection. To be used to express the ulceromembranous stomatitis caused by Vincent's spirillum and fusiform bacillus in preference to *Vincent's angina;* the latter being more applicable to the throat infection.

x-ray (n.) This word is used indiscriminately as noun and verb. It should not be used as a verb. The word Roentgen ray is preferable. It should also be used with the small x rather than with the capital letter X, if used at all.

In concluding the report the committee would again earnestly solicit the cooperation of all committees representing the various specialties of dentistry, as well as all dental societies and individuals to the end that

progress in this department be apace with that so apparent in all other phases of dentistry.

Respectfully submitted,

L. P. ANTHONY, *Chairman,*
C. N. JOHNSON,
R. OTTOLENGUI,
OTTO U. KING,
C. E. WOODBURY, *Committee.*

[NOTE. The report was accepted, and upon recommendation of the Reference Committee of the American Dental Association the words offered in last year's report are included in this, in order to bring the work of the Committee on Nomenclature up to date and centralized in one report.—L. P. A.]

DEPARTMENT OF ORTHODONTIC TECHNIC

Edited By
H. C. Pollock, D.D.S., St. Louis, Mo.

ELEMENTARY ORTHODONTIC TECHNIC

By H. C. Pollock, D.D.S., St. Louis, Mo.

(*Continued from October*, 1923.)

Anchorage (continued)

In the upper right hand corner and also in the lower occlusal view in Fig. 30 may be seen a practical failure in the operator's miscalculation of the question of anchorage in treating a case. The lower right first molar has been "backed off" so to speak, as a result of the pressure exerted in the distal direction by the appliance. The first molar teeth at the age of seven or eight years cannot be expected to offer very much resistance to stress placed upon them because their roots are not entirely calcified. This is well shown in Fig. 30.

In this case the first molar has been pushed distally in contact with the erupting second molar, thereby impacting the latter. It has been impossible to accomplish the desired movement of all of the mandibular teeth *en masse*, inasmuch as the anchorage of the lower first molars was giving away to all stress placed upon it.

In the case in Fig. 31, lower, the anchorage of the right first molar has been displaced distally as a result of miscalculation of stress placed thereon by means of the appliance used. In this case there has been a distinct backward pressure exerted by the lingual wire which has not been compensated for in the adjustment of the outside labial arch wire. It will be seen by comparison with the original (upper picture in Fig. 31) that the first molars have not only been moved in the buccal direction, but they have also been moved in the distal direction as a result of lost anchorage; this latter direction of movement was by no means desired or anticipated.

The student who realizes the tremendous value, importance and significance of this subject, will do well to refer also to the article by Herbert Pullen, which appears in the International Journal of Orthodontia, October, 1919, v, 10, "Anchorage Principles in Modern Orthodontia."

Pullen says, "Anchorage consists in the selection of adequate and properly distributed resistance units for the control and direction of force applied to the teeth for dental arch development or for lesser tooth movements.

"According to this definition the selection of resistance at the points of delivery of a force is as much anchorage as the selection of basal resistance in the anchor teeth, and this new interpretation of anchorage so extends its scope that the formerly undesignated points of application of the force may be properly designated and defined as they should be.

"In the modern evolution of anchorage principles, it has become of para-

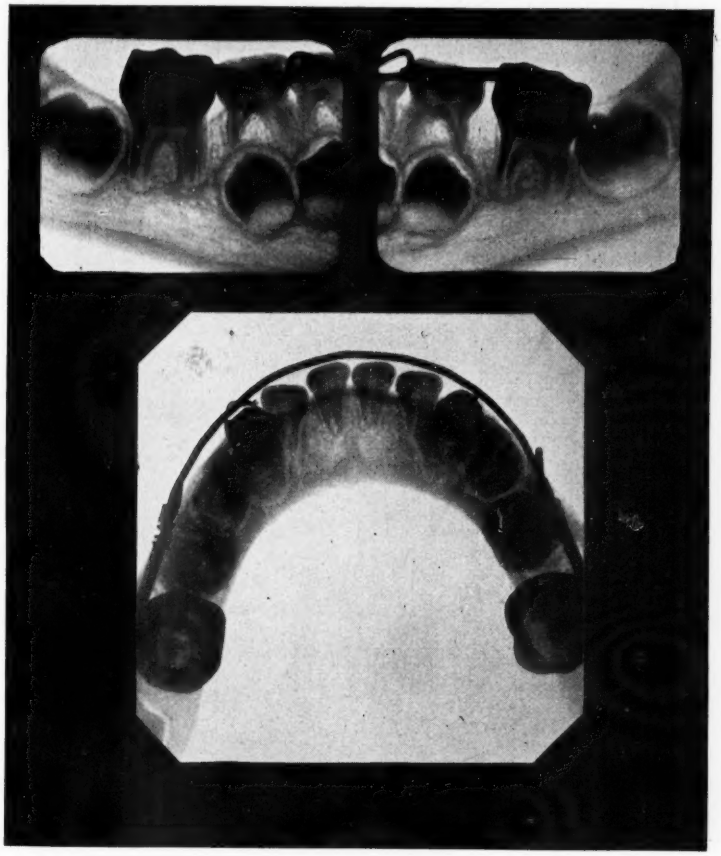


Fig. 30. (Simpson.)

mount importance to thus distinguish between the resistance at the basal anchorage of the appliance and the opposed and often reenforced resistance at the other points of delivery of the force."

PRINCIPLES OF MECHANICS

The principles of mechanics in the movement of teeth are equally as important as those of anchorage which have been previously discussed in this series of articles.

An orthodontic appliance, regardless of type or design, is primarily a spring making an effort to release itself from its moorings. The proper reciprocation of this potential energy from tooth to tooth, or from group to

group of teeth, becomes the deciding factor in causing teeth to move to the point and in the direction desired. Involved in the application of this force are combined principles of physics and dynamics as exemplified in the inclined plane, the wheel, the screw, the lever, the pulley, and the wedge.

Inasmuch as these pages are a digest of current orthodontic literature and are primarily intended for the benefit of those who are anxious to develop elementary orthodontic technic rather than for the trained ortho-

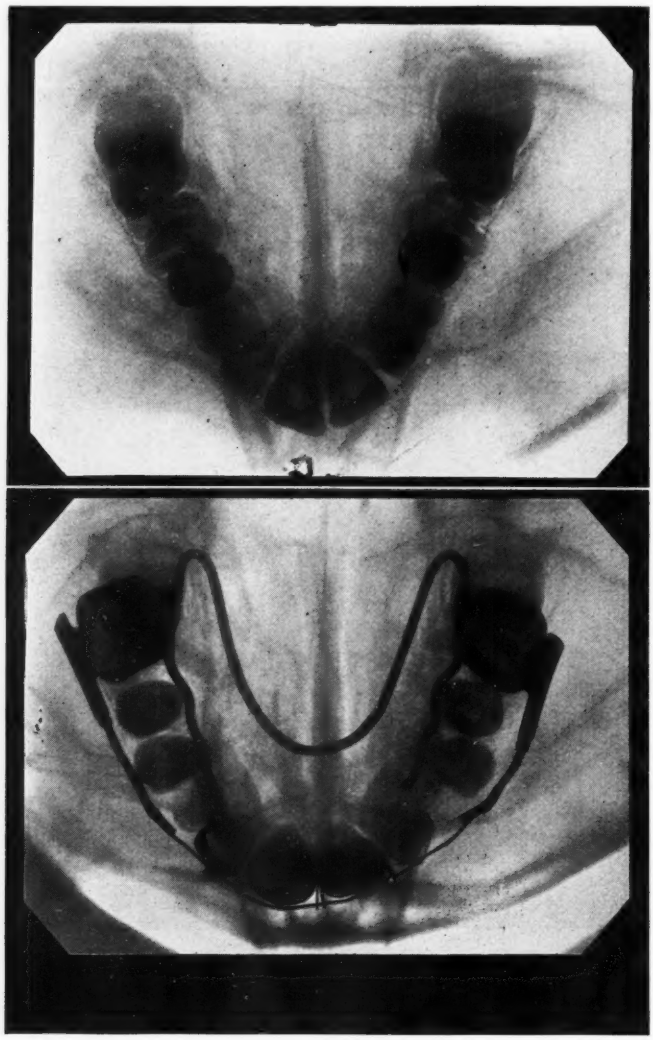


Fig. 31. (Simpson.)

dontist, the reader is referred to the writings of the late Dr. Calvin S. Case who in his book "Dental Orthopedia and Correction of Cleft Palate," published a short time previous to his death, has tabulated the experience and knowledge of a lifetime spent in the correction of malocclusion. Of particular merit and significance are Chapters XIII and XIV, devoted to a most complete and detailed review of the principles of mechanics in the movement of teeth. Thirty-eight pages are allotted to this subject, and the student may increase his fund of information tremendously. With such complete

discussions accessible, it is useless to repeat them here. Dr. Case's book is truly a monumental work.

INTERMAXILLARY ANCHORAGE

After the student has become familiar with the technic of adjusting and fixing to position the labial arch wire, which can be said to be the most approved of the various types of fixed appliances in use, and with the principles of mechanics involved therein, as well as the principles of anchorage, he must then gain a knowledge of another most generally adopted force applicable in the treatment of many cases of malocclusion—the Baker, or intermaxillary, anchorage—which concerns the reciprocation of mechanical forces as applied between the maxillary and mandibular dental arches. (Fig. 32.) This force is now considered essential in the treatment of certain types of cases, particularly those types belonging to Class II and Class III and their various subdivisions (Angle classification). This force is created through the attachment of rubber bands of various sizes and degrees of

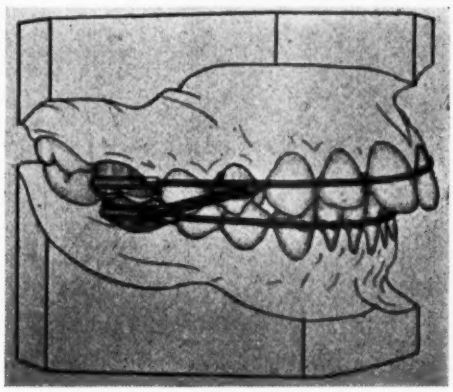


Fig. 32. (Pullen.)

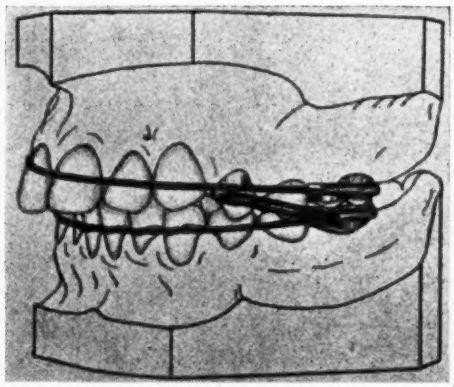


Fig. 32. (Pullen.)

elasticity, extending from a point on the appliance opposite the canine region on the maxillary appliance to a point in the buccodistal angle of the first molar on the mandibular appliance, and is for the purpose of completing a distal or mesial movement (depending upon adjustment) of the buccal teeth of one dental arch as related to the opposing dental arch. It is also of tremendous aid in correcting protrusions and retrusions of the anterior teeth. (Fig. 33.) The force exerted by the small rubber bands when properly manipulated is surprisingly effective in the movement of teeth. The rubber bands known as election rings can be secured from supply houses in various sizes and widths, or from large rubber manufacturing houses in considerable quantities. (Fig. 34.)

Fig. 35 shows the effect which can be secured by the use of intermaxillary force—a case of Class II in which the bulk of the energy required for correction has been acquired from the use of the small rubber elastics. In many cases described as "jumping the bite," good results have been accomplished by the use of this principle of anchorage. Many practitioners, even at this time, who include the treatment of malocclusion in their practice,

totally ignore the intermaxillary anchorage in their treatment and have not acquired a working knowledge of this highly important and successful principle. The use of a crooked stick to plow a field as in biblical times, ignoring the modern plow, would impose no greater handicap than the lack of a thorough and complete technical understanding of the intermaxillary anchorage in the treatment of malocclusion in this era of orthodontic development. All the standard textbooks include in their pages complete details as to the principles of this anchorage.

Following is a quotation from Dewey on this subject:

"With the use of intermaxillary anchorages, as described by Baker and used on a distoclusion, or Class II, Division 1, case, a new plan of treatment was given orthodontia. With the use of intermaxillary anchorage, it became possible to move the maxillary teeth backward and the mandibular teeth forward. The forward movement of the lower teeth was the great feature of intermaxillary anchorage. Up to that time there was no means of

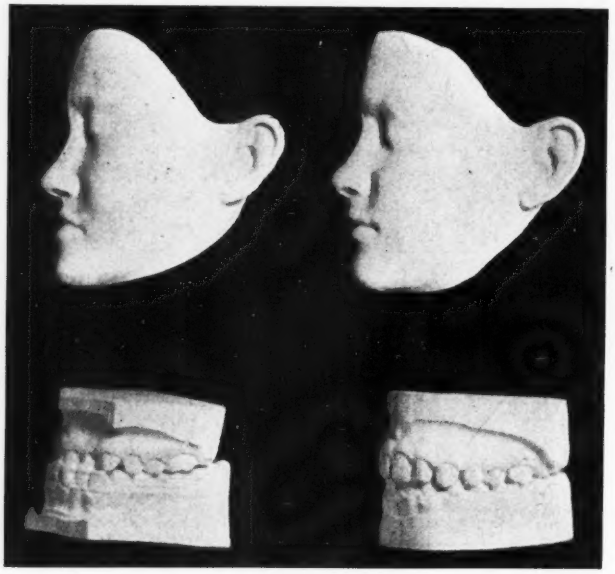


Fig. 33. (Case.)

bringing about this condition, for the plan known as 'jumping the bite' moved the teeth only as the mandible was moved by muscular action. After Baker described the treatment of his case, Angle began the use of intermaxillary anchorage in distoclusion and mesioclusion cases. The following was accomplished:

"1. Establishment of the normal mesiodistal relation of the inclined planes of the teeth.

"2. Widening of the upper arch and reducing the protrusion of the maxillary anterior teeth.

"3. Movement of the maxillary teeth backward and the mandibular teeth forward, bringing about the normal relation as described in paragraph one.

"4. Improvement of the facial outlines of the individual by so doing.

"5. Production of normal muscular action by making it possible for the individual to close the lips over the teeth.

"6. Making normal breathing possible because the patient could close the lips.

"More satisfactory results could be obtained with this plan of treatment than from any of the others mentioned. The great improvement was the result of having moved the lower teeth forward. However, normal occlusion was not always established by obtaining the proper relation of the inclined planes; for in moving the maxillary teeth backward and the mandibular teeth forward, a tipping of the teeth was produced, which was not desired. After the treatment of these cases it often occurred that the chin and mandible would be undersized. For his reason it was believed that better results would be obtained if the plan of treatment was changed slightly, which resulted in the following plan, the object of which was to establish normal occlusion of the teeth: First, by widening the upper arch

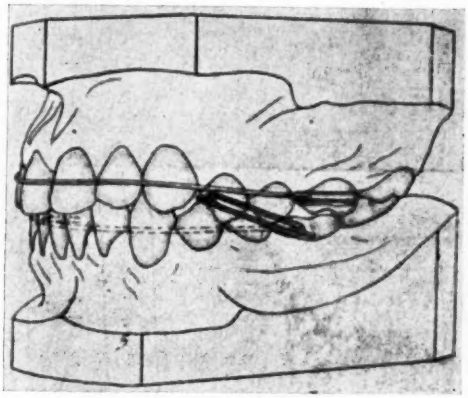


Fig. 34. (Pullen.)

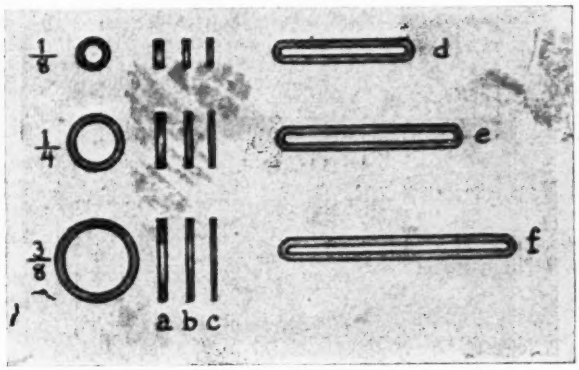


Fig. 34. (Pullen.)

and retracting the protruding upper anterior teeth: second by moving the lower teeth forward the entire distance (do not move the upper molars backward) third, by making such anchorage and attachments as would prevent the lower teeth from tipping, which would bring them forward in an upright position. As a result of this plan, the best facial outlines were obtained, the mandible was developed to its normal size, the muscular action became normal, and the chin was developed.

"It has been shown in the majority of these Class II, Division 1 cases that the maxillary molars are not too far forward. Such being the case, a plan that would approach the ideal result must be one that will not move these teeth backward. Therefore, our efforts should be directed toward moving the lower teeth forward and developing the mandible.

"By examining a large number of these cases, by studying the facial outlines and the anatomy of the temporo-mandibular articulation, the author is convinced that the great deformity that we encounter in these cases in the mandibular region is a result of the underdevelopment of the mandible and is not the result of the distal location of the condyle. These cases are micromandibular development and not postversion of the mandible. There-

fore our treatment should be one of such a nature as will produce a development of the mandible that can be brought about by the last named plan."

In discussing further the question of the importance of intermaxillary anchorage, it is of interest to refer again to the writings of Herbert Pullen on the "Treatment of Distoclusion" published in 1920. Excerpts from Pullen's article follow:

"The intermaxillary elastics should be gauged according to the degree of force required, beginning with light elastics, increasing to heavier, and ending at retention with the lightest elastic that will retain in the mesiodistal change. The combination of appliances shown in Fig. 32 may be worn for retention, the maxillary labial alignment wire being finally worn only at night with very light elastics before completion of the case.

"The chief force in effecting the mesiodistal change in distoclusion is the intermaxillary force produced by the use of elastic rubber rings preferably cut from new Para black rubber tubing. The writer has found that

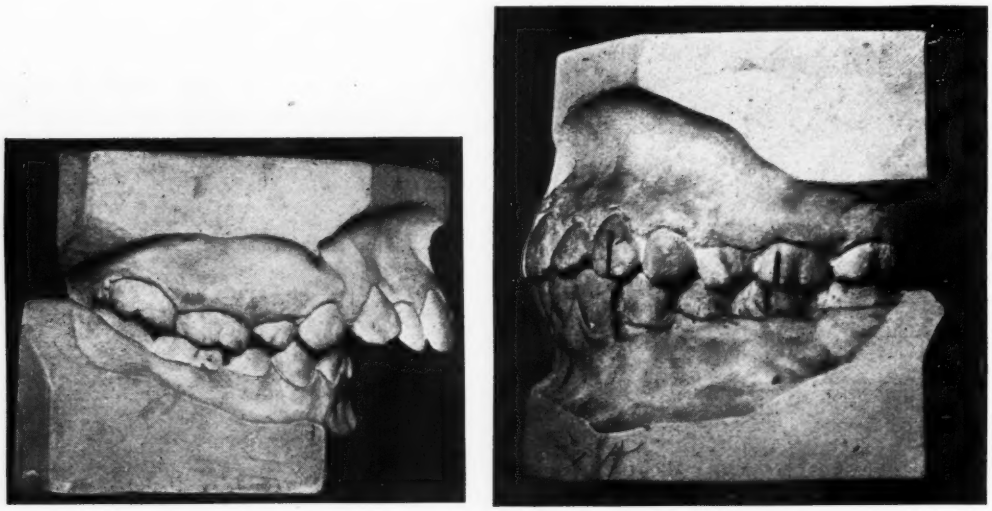


Fig. 35.—Class II Division 1 cases always treated with intramaxillary anchorage, so-called "jumping of the bite."

better results are obtainable from having a series of graded sizes of these rubber rings cut from three sizes of tubing, each size of tubing being cut into rings of three different sizes, and marked thin, medium, and thick.

"The thin size of the large diameter tubing $\frac{3}{8}$ inch internal diameter should be used at first, until the patient gets used to the tension, the medium size next, and the thick size, next, thus increasing the tension by degrees instead of beginning with the maximum force.

"The next size smaller ring, $\frac{1}{4}$ inch internal diameter may be used in the same manner in many cases, especially where the hooks on the maxillary alignment wires and mandibular molar bands are not far apart. A record should be kept of each change of size of the rubber rings, so that there may be continuous progress in the case from the use of the minimum to the maximum force."

(To be continued.)

DEPARTMENT OF
ORAL SURGERY AND SURGICAL ORTHODONTIA

Under Editorial Supervision of

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SOME OBSERVATIONS IN THE DEVELOPMENT OF THE MAXILLA IN CLEFT PALATE CASES*

By M. N. Federspiel, B.S., D.D.S., M.D., F.A.C.S., Milwaukee, Wisconsin

Professor of Oral Surgery Marquette University, Head of Department of Surgery Federspiel Dental Polyclinic, Oral Surgeon to Milwaukee Hospital

THE first synopsis of the development of the external form of the human body is given by W. His in his "Anatomie Menschlicher Embyronen" 1880—1885. Since that time the literature on human embryology has become quite voluminous. It is unnecessary here to discuss the development of the human body other than the mouth.

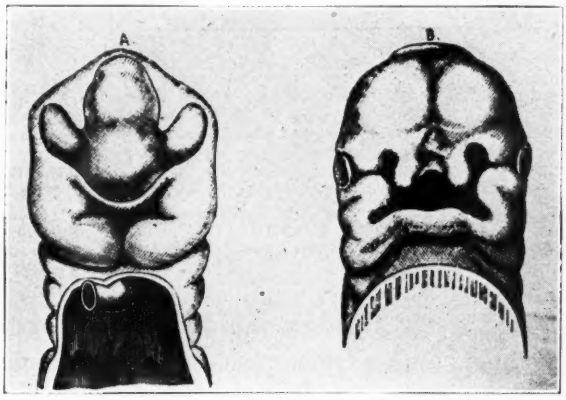

Fig. 1.—(*a*) Head of fetus, of about five weeks, from ventral aspect, showing the primitive stomodeum bounded above by the undivided frontonasal process, laterally by the maxillary, and below by the still separate mandibular processes. (*b*) Head of fetus from ventral aspect of a little later date (6 to 7 weeks). The mandibular processes have united, and the frontonasal process has developed into external and internal nasal processes around the nasal fossae. (After His.)

The examination of a human embryo a little over 2 mm. in length will reveal upon the ventral surface, in front of the yolk sac a round protrusion, the heart, and in front and above a depression, the oral sinus. The anterior

*Read before The American Society of Orthodontists, Chicago, Ill., April 9-11, 1923.

boundary of the oral sinus is formed by the projecting frontal extremity of the brain. The sides of the oral sinus are formed by the maxillary and mandibular processes.

In human embryos of 8 mm., at about the fifth week, the nasal cavity is still a part of the oral sinus. At about the beginning of the seventh week there is a change taking place in the anterior boundary which becomes concave, the lateral surface forming in a thickened elevation called the processus globularis. (Fig. 1.)

On each side of the processus globularis there is developing a thickened outgrowth from the frontonasal process called the external nasal process, which forms the alanasi and the soft tissue adjoining.

The globular processes and the maxillary process unite to form the nasal pits. The growth is toward the center until they meet to unite and the anterior of the mouth is complete. The globular processes, when united, form the central portion of the upper lip called the philtrum, and below the lip is

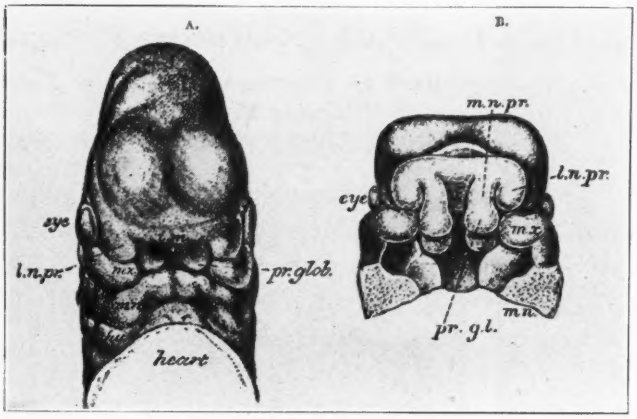

Fig. 2.

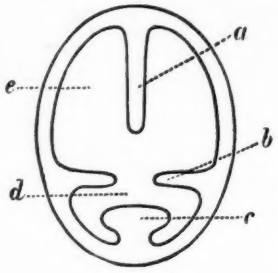

Fig. 3.

Fig. 2.—(*a*) Head of fetus at a somewhat later date (8 weeks) as seen from the front, showing the nasal and maxillary processes in close apposition, and the clefts between them diminishing in size. (*b*) The same, seen from below, the mandibular process having been removed.

im, Central portion of frontonasal process; *m, n, pr*, internal nasal process; *pr, gl*, globular process; *l, n, pr*, external nasal process; *m, n*, mandibular process. (After His.)

Fig. 3.—Diagrammatic presentation of the development of the palatal processes and of the ethmovomerine plate seen in vertical section. (After Gegenbaur.)

a, Ethmovomerine plate; *b*, palate processes; *c*, tongue; *d*, buccal cavity; *e*, nasal cavity.

formed the inner segments of the intermaxilla called the endognathion; above the philtrum is developed the prominence of the nose growing from the medium portion of the frontonasal process.

From the deeper aspect of the external nasal process the mesognathion is formed to unite with the endognathion, thus forming the intermaxilla.

About a week after the buccopharyngeal membrane disappears, the mandibular arch is formed on either side, forming the lateral and lower boundaries of the oral cavity. Each side grows forward to meet its fellow in the middle line, thus forming the mandible and the tissues covering it. (Fig. 2.)

The mouth and nose at this time still remain one cavity; the roof is the base of the skull.

At about the seventh week there is an outgrowth from the deep aspect of each maxillary process of the horizontal plates, which when united form the hard and soft palate; these unite with the endognathion and mesognathion of the frontonasal process thus dividing the nasal and buccal cavities.

The nasal cavity is divided into lateral halves by the downward growth

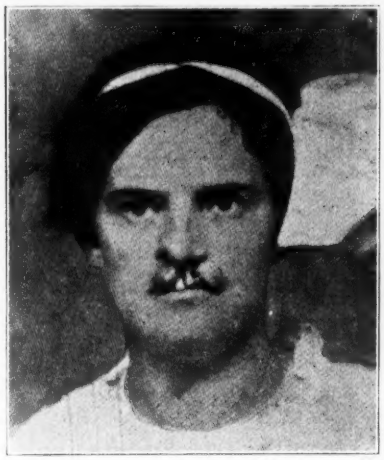

Fig. 4.—A cleft of the lip and a normal intermaxilla.

Fig. 5.—A cleft palate.

Fig. 6.—A complete harelip and cleft palate.

of the deeper aspect of the frontonasal process of a central vertical septum, to become in time the cartilaginous septum nasi, and the long ethmovomerine plate uniting at its lower border with the horizontal plates of the maxillary process and the median line of the intermaxilla. (Fig. 3.)

Failure of union of the various parts that make up the lip, the premaxillary bone. and the palate, will produce a cleft. Union of the individual process begins in front and proceeds backward; therefore, if the process

which forms the lip should fail to unite while the processes which form the intermaxilla and palate should unite, the result would be a cleft of the lip and a normal intermaxilla and palate. (Fig. 4.)

If the processes which form the lip should unite while the processes which form the intermaxilla and palate fail to unite, the result will be a normal lip with a cleft involving the palate and alveolus. (Fig. 5.) If the processes which form the lip, intermaxilla and palate should fail to unite, the result is a complete harelip and cleft palate. (Fig. 6.) If the two globular processes fail to unite, the result would be a median cleft of the lip. (Fig. 7.) If the two mandibular processes should fail to unite, the result would be a cleft of the lower lip, and may involve the mandible. (Fig. 8.) If there is an imperfect development in the connection between the maxillary and mandibular processes from which the cheeks are developed, the result will be a large rimaoris, which may resemble a cleft in the cheek called macrostoma. (Fig. 9.)

Fig. 7.—A median cleft of the lip. (After Rose.)

Fig. 8.—A cleft of the lower lip.

Fig. 9.—Macrostoma, showing the cleft in the cheek prolonged upwards and backwards by a reddish cicatrix to a lateral loss of substance of the cranial wall. (Sutton.)

Fig. 10.—Facial cleft. (After Rose.)

If there is a failure of union between the maxillary and the internal nasal

processes, the result is a facial cleft. (Fig. 10.) Should there be a failure of union between all of the processes that go to form the oral nasal cavity, the result would be not only a shocking, but a hideous deformity, which might be called a monstrosity. (Fig. 11.)

In the study of the development of the various forms of cleft that may be produced on account of the various processes not uniting, one can appreciate that a cleft may be a mere notch, or so extensive as to involve one or all the fissures.

However, in this paper we are only concerned with the cleft of the lip

Fig. 11.—The result from a failure of all of the processes to unite that form the nose, mouth and surrounding structures. (Delafield and Prudden.)

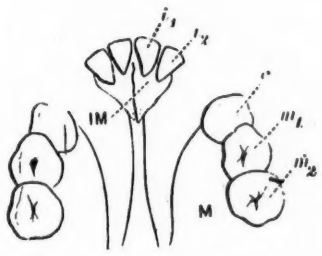

Fig. 12.—Diagram presenting the old or 'Goethe" theory of alveolar harelip, indicating both central and lateral incisors as developed from one intermaxilla on either side, and the alveolar cleft between the maxilla and intermaxilla.

M, Maxilla; *IM*, intermaxilla; i_1, central incisor; i_2, lateral incisor; *c*, canine; m_1, first molar; m_2, second molar.

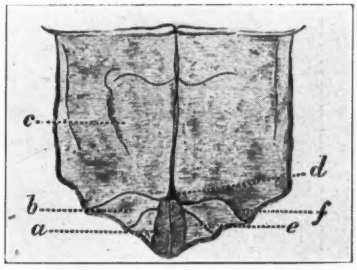

Fig. 13.—Bony palate of a fetus of six months, showing the development of the intermaxilla in four portions.

A, Endognathion; *b*, mesognathion; *c*, exognathion; *d*, anterior palatine canal; *e*, endomesognathic suture; *f*, exomesognathic suture. (After Gilis.)

and cleft of the alveolus and the palate. As I have shown above, the intermaxilla is formed from two centers on each side, the endognathion and mesognathion, and these centers when united form a separate bone which later becomes united with the horizontal processes of the maxilla.

Dr. Robert Nesbit in 1736 was probably the first actually to discover that the intermaxilla was a separate bone which later became united with the

maxilla. However, as far back as in the time of Galen the intermaxilla was found to be a separate bone in the apes and lower animals.

Goethe in 1779 demonstrated the extent of the intermaxilla in the human fetus, and as the outcome of this discovery reported his belief that a cleft of the alveolus could only occur at the maxillo-intermaxilla suture. i.e., between the lateral incisor tooth and the canine, (Fig. 12.) This belief was handed down until Albrecht in about 1879, and in a number of papers after

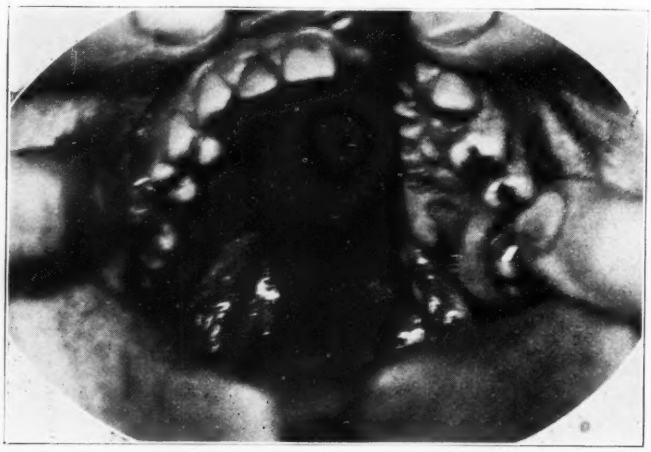

Fig. 14.—A cleft caused by the endognathion and the mesognathion on one side missing.

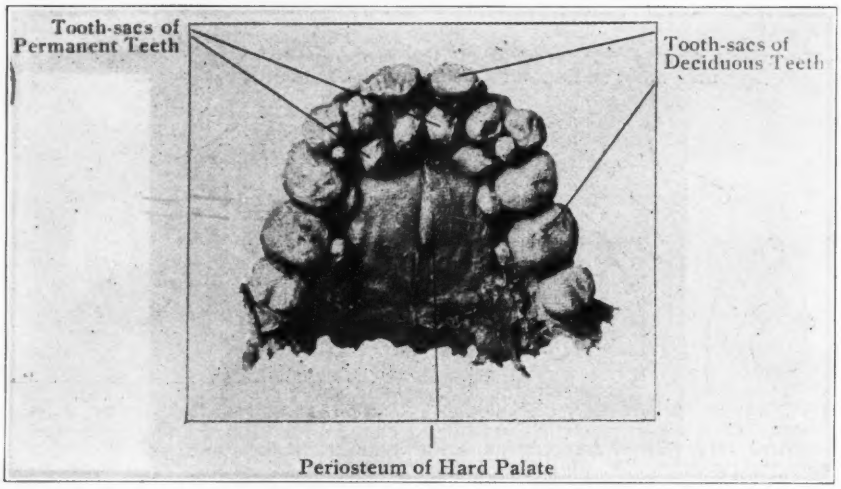

Fig. 15.—Tooth follicles for deciduous and permanent teeth, three months after birth. (After Broomell.)

that time, demonstrated that the intermaxilla is not developed en masse, but is formed by the union of four segments, two on each side. (Fig. 13.)

Since that time embryologists have conclusively proved that the intermaxillary bone is developed from four centers, to unite later with the maxilla proper. As I have said before, if failure of any of these centers to unite occurs, a cleft will exist. Goethe and his followers have believed that a cleft of the alveolus will be between the intermaxilla and the maxilla. Al-

brecht and his followers have demonstrated that the cleft of the alveolus will extend between the endognathion and the mesognathion.

During the formation of the intermaxilla and maxilla in embryo at about the fortieth day, at the location where the alveolar process develops, there appears an ingrowth of epithelium, which extends deeply into the mesoblastic tissue. At each point where the tooth is going to be formed, a bell shaped thickness appears at about the forty-eighth day, or about the seventh week. It is interesting to know that about that time the union of the endo-, meso-, and exognathion should be united. If the mesognathion is delayed in its formation, the exognathion and endognathion may grow towards each other and prevent the full development of the mesognathion. The result is that the epithelial thickness to form a lateral tooth will be retarded, or arrested in its growth, or it may be obliterated.

In my clinical experience in cleft palate cases, I have observed that the cleft of the alveolus is usually between the endo-, and mesognathion, that

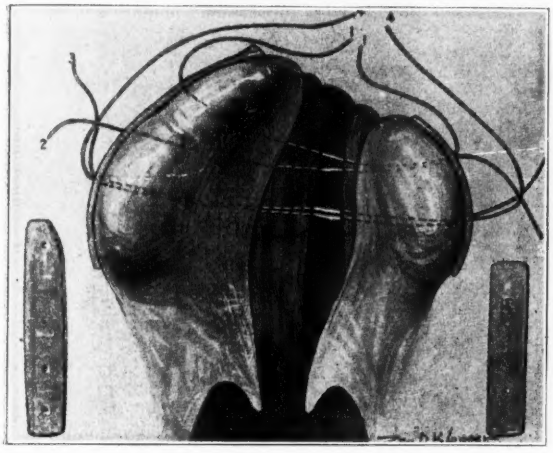

Fig. 16.—Wires and plates in position. The method of fastening the wires is shown by numbering each end. Right and left lead plates are shown. (After Brophy.)

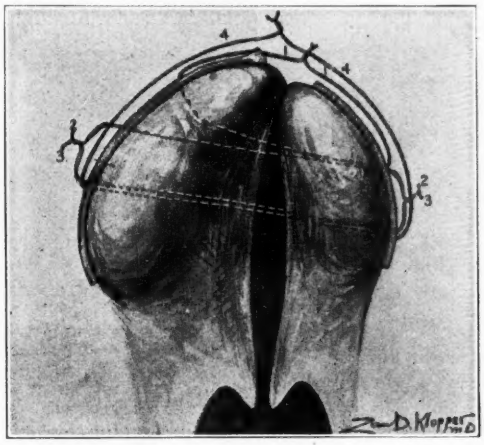

Fig. 17.—Twisting of the wires completed. (After Brophy.)

the cleft is not only due to a failure of union, but also on account of the mesognathion having failed to develop. In such cases there is always a lateral tooth missing. Accordingly the endognathion and the mesognathion structures may be missing, leaving a large alveolar cleft. (Fig. 14.)

It is interesting also to note that at birth the tooth buds have developed deeply in the mesoblastic tissue, so that only a thin plate of bone separates the alveolar cavities from the orbit. The antrum at this time does not as yet exist. In correspondence with the elongation with the tooth sacs, the alveoli become increased in depth. Combined with a general interstitial growth, the antrum begins to form. Any loss of tooth germs during this period will greatly interfere with normal jaw growth.

Fig. 15 illustrates the position of the tooth follicles three months after birth. Any injury to the tooth buds at this time may not only destroy them, but also displace the teeth from the normal path of eruption. This is especially true in cleft palate cases if an attempt is made to pass wire ligature through

the alveoli after the Brophy method. (Figs. 16-17.) The trauma produced by these wires will usually destroy some of the tooth buds, or shift the tooth buds from the normal position in the mesoblastic tissue. Figs. 18-19 show some striking cases where some of the teeth have been destroyed and missing, with a general malrelation of the teeth and undeveloped arches, which was brought about by passing wire ligature through the alveolar process in an attempt to close the alveolar cleft.

Fig. 18.—Result after an attempt to close a cleft by passing wire ligature through the jaw; notice loss of permanent teeth and malposition of the teeth.

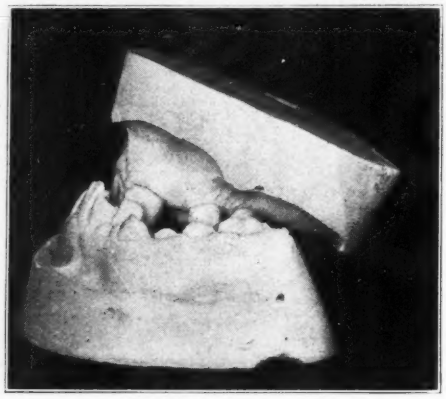

Fig. 19.—Showing undeveloped upper jaw from loss of teeth due to passing silver wires through jaw in infancy for repair of cleft palate.

I always recommend that practitioners who are present at the birth of a child with a harelip should see to it that the borders of the cleft are held together, or nearly so, with adhesive tape. The chief reason for this preoperative care is that the pressure brought about by the adhesive tape will greatly assist in molding the lip so that the fissure becomes narrower. In patients who have a cleft of the lip and alveolar process such treatment often aids in reducing not only the width of the lip cleft, but also narrows the cleft of the alveolar process. When one observes a child with a harelip crying or laugh-

ing the sphincter-like action of the orbicularis oris muscle cannot functionate normally, so that when contraction occurs each half of the lip pulls away from the center, and therefore exaggerates the deformity. If, however, the borders of the lip are held together with adhesive tape, the child in the act of crying or laughing will fail to widen and evert the edges of the cleft. The tendency then will, by muscular pull, cause the cleft of the lip and alveolar process to become more narrow during the growth of the child. (Figs. 20-21.) The narrowing of a cleft during the preoperative care is of great importance to the surgeon in obtaining a better cosmetic result.

In cases that have a complete cleft of the lip and alveolar process, and palate, some surgeons recommend the closing of the alveolar cleft first and then at a later time the cleft of the lip, especially so if the Brophy operation is to be performed, as the surgeon has better access to the palate. However, I have abandoned, in most cases, this method for the reason that after the

Fig. 20.—This patient was strapped with adhesive tape in order to reduce the width of the cleft.

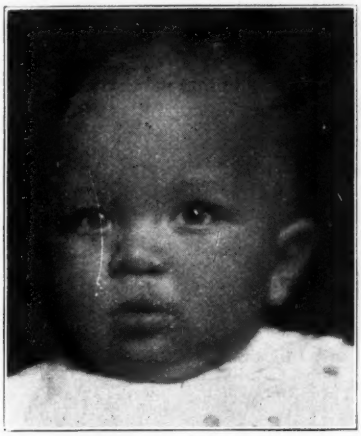

Fig. 21.—The same patient after the borders of the cleft were united.

cleft of the lip is closed the sphincter-like action of the orbicularis muscle will usually mold the alveolar cleft so that its borders approximate, and in some cases closure takes place. In such cases after the cleft of the lip and alveolar process are united I close the palatal cleft several months later. At no time, in closing the hard and soft palate, have I found any difficulty, arising from a previous operation on the lip.

That the intermaxilla is developed from four centers—two sections of endognathion and two sections of mesognathion—is now an established and recognized fact. Therefore, one is justified in recognizing the intermaxilla as a distinct bone subject to anatomic and pathologic changes during growth. Delayed calcification and union with the lateral halves of the horizontal plates of the maxilla will determine its shape and position later in life.

Sucking the thumb in infancy will stretch the bone in an anterior posterior line, carrying with it the four incisors which if protruding beyond the

normal line of occlusion will permit the vermillion border of the inferior orbicularis oris muscle to rest against the lingual surface of the intermaxillary teeth.

This malrelation of the lower lip will, through muscular action, force the teeth anteriorly so that labio-version of the teeth with elongation of the intermaxilla may be so excessive as to prohibit normal development of the upper lip. This abnormal development of the intermaxilla and protruding incisors may likewise be established from nasal stenosis. Enlarged adenoids in the unborn and in infants, if not removed will promptly disturb the normal balance of jaw growth.

The contour of the face is largely influenced by the muscles which move

Fig. 22.

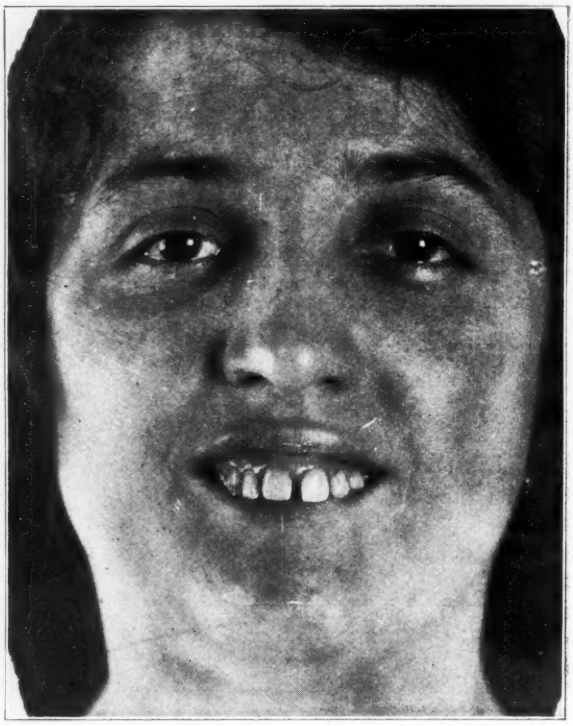

Fig. 23.

Figs. 22 and 23.—Elongation of the premaxillary bone with labioversion of the anterior teeth.

the jaws. Thus, when nasal stenosis exists from any pathologic manifestation, such as enlarged tonsils, adenoids, deflected septum, hypertrophy of the adenoids, the powerful muscles which close the jaw, the masseters, temporals, internal pterygoids remain usually inactive, and become weakened and subject to atrophic changes; while the muscles that open the mouth, the digastric, mylohyoid and geniohyoid and the platysma, become more active in holding the mouth open. Then if such a condition exists in early childhood, especially at the time when the glenoid cavity is nearly flat, with no well-marked surrounding elevations, the mandible is not only held down, but the muscles are usually active in shifting the mandible backward and preventing its free growth forward. Naturally, if such abnormal action of the jaw muscles re-

mains over a number of years during growth, the shape of the mandible may not only be an obtuse angle, but undeveloped; or it may be displaced in retroversion.

I am satisfied that delayed closure of the intermaxillary suture, accompanied by thumb sucking and lower lip pressure, is responsible for the elongation of the intermaxillary bone and labio version of the incisors.

I have come to the conclusion that in the development of the maxilla there is a great tendency for an anteroposterior elongation, but this elongation takes place almost entirely in the intermaxillary bones, and is much greater in the orang-outang and the gorilla than in the chimpanzee. The reason for this is that the intermaxillary suture closes much earlier in the

Fig. 24.

Fig. 25.

Figs. 24 and 25.—The result after partial resection of the premaxillary bone and extraction of the anterior teeth.

chimpanzee than the other two genera of anthropoid apes. The prognathism that we find in anthropoid apes is because of the long continued growth of the intermaxilla, and from my observation I am quite satisfied now that the prognathism of the lower races of mankind is because the obliteration of the suture takes place later than in the modern man.

A very interesting case of anteroposterior elongation is illustrated in Figs. 22-23. Miss M., twenty-three years old, in good general health, occupied in clerical work, reported to our clinic about two years ago. Upon examination we found that she had a typical elongation and overdevelopment of the intermaxillary bone with a pronounced labio-version of the maxillary incisors. There was no pathologic condition involving the nasal and pharyngeal area,

and her breathing through the nose was free and easy. The mandible showed the usual development.

If the diagnosis were made from the position of the incline planes of the teeth according to the antiquated, obsolete and numerical classification, this case still would have to be treated by bringing the mandibular arch and teeth forward, widening the maxillary arch, and retracting the maxillary anterior teeth. Many of us, no doubt, have attempted this form of treatment, which gives splendid results when applied rightly and carefully during the developmental period, but to attempt such treatment without extracting, in a case of this kind, would bring results about as positive and satisfactory as the Coué treatment in his "day by day in every way I am getting better and better."

Fig. 26.

Fig. 27.

Figs. 26 and 27.—Lips held slightly apart showing the artificial teeth; notice improvement of facial outline and compare it with Figs. 22 and 23.

As I said before this patient came to us about two years ago to have this pronounced deformity corrected by orthodontic methods. Unfortunately we found that the patient had lost a large number of posterior teeth, and most of her remaining teeth were undergoing gingivo-pericementitis. We informed the young lady that in our judgment orthodontic treatment would be contra-indicated, as her teeth were undergoing a progressive suppurative pericementitis. Therefore, we advised the complete removal of all her maxillary teeth and partial resection of the premaxillary bone to be done subperiosteally, followed by the fitting of an artificial upper denture. It took her just one year before she could make up her mind to undergo such an extreme and radical operation, but when she fully understood that she was not only suffering from a deformity, but an infectious process which was undermining her

health, she was ready to comply with our advice. The operation was done, and in less than one month healing had taken place, and the lost teeth restored with an upper denture. I want to call your attention to the marked improvement in her facial outline. (Figs. 24, 25, 26, 27.) It was very difficult for

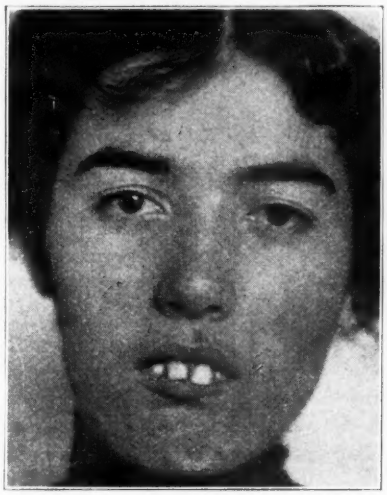

Fig. 28.

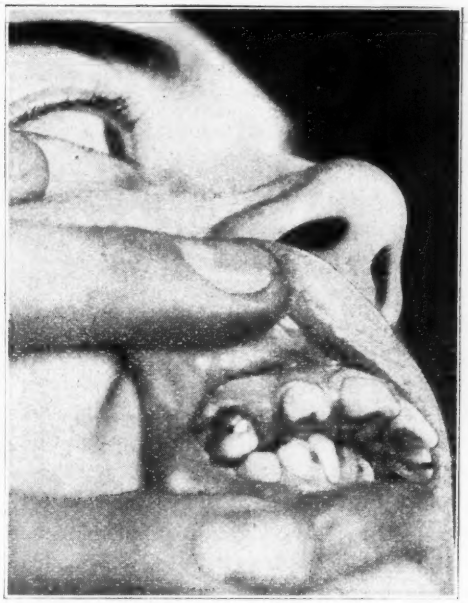

Fig. 29.

Figs. 28 and 29.—A marked elongation of the premaxillary bone and labioversion of the teeth.

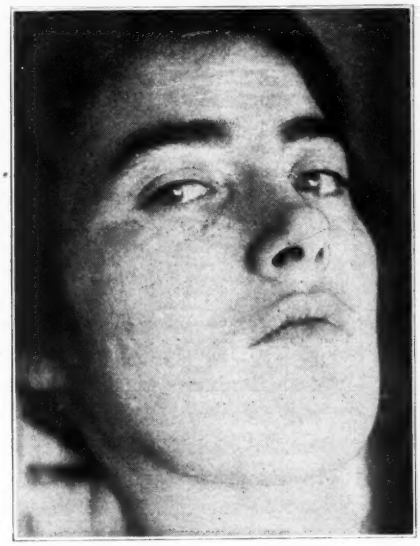

Fig. 30.—Result after operation and restoration of artificial teeth.

her to bring her lips together, and if she did so they were under a tension. Now her lip function is free and easy, and they come together without any effort on her part.

Another case, similar to the one I have just described, is shown in Fig. 28. This patient had a marked elongation of the intermaxilla with protruding

maxillary incisors. (Fig. 29.) In this case the mandible and the mandibular arch apparently are of normal size. The alveolar process surrounding the incisor teeth was overdeveloped to such an extent that the patient found it difficult to close the lips. There was also a marked gingivo-pericementitis involving these teeth. In this case we found that in order to improve the patient's facial outline, and to improve her forces of mastication and normal lip function, a surgical operation for the removal of the incisors and cutting out the protruding mass of the alveolar process with subsequent restoration of artificial teeth was necessary. This was done, and Fig. 30 shows the result after the operation. Notice the lips resting together with the natural wrinkling that should take place in a normal lip. This patient gives the information that she sucked her thumb when a child. Undoubtedly the pressure from thumb sucking during the developmental period stimulated the intermaxillary bone to elongate.

DISCUSSION

Dr. Kelsey.—Mr. President and members of the American Society: I feel very much honored to have been asked to discuss this paper, the more so since I have heard Dr. Federspiel's elucidation of the slides which he has shown. For a long time I have been an admirer of the progressive work that Dr. Federspiel has been doing in this line. He has undoubtedly made use of the thought and progress of other men, but he has contributed very largely to the technic of the correction of the cleft palate deformities. I suppose I was selected to discuss this paper because of some small reports I have made occasionally with regard to cleft palate cases, but I have found upon looking at Dr. Federspiel's paper that it involved much more than that, and I could discuss very inadequately the technical part of the cleft palate plastic operation because I know nothing of that, and have worked only on the orthodontic side of it, making corrections of the cases as they have appeared after the cleft palate has been operated upon surgically.

Dr. Federspiel's explanation regarding the absence of lateral incisors is rather new to me, very interesting, and plausible. The absence has been explained in many ways but most of us have failed to explain it at all; we believed we could not explain it. If it is true that it may take place in the manner that he has suggested, it seems to me that we are quite indebted to him for the information on that subject. It does not, however, explain the absence of other teeth such as the premolars, which occur almost as frequently. However, it does not prove that his explanation is not correct, and I feel very much inclined to accept it.

I have found one or two cases of the palate, one in particular in which a lateral incisor was on the distal side of the cleft. That was sometime ago, and it was rather confusing under the old theory that the cleft always occurred between the maxillary and premaxillary bones.

Under the explanation that Dr. Federspiel has given us, it seems the most natural thing in the world. With regard to the other phases of Dr. Federspiel's work which I might discuss more intelligently, I want to say that in no sense do I criticize his statements regarding the possible development or overdevelopment of the premaxillary bone, but I feel that possibly the analogy he has drawn between man and the lower man and the anthropoid apes may not be so well founded.

The elongation of the intermaxillary bones in the jaws of apes is a normal condition, and one that occurs regularly as a normal process of development. The size of the teeth and the shape and size of the jaws determine this. The length of the intermaxilla in the primitive races of man is also quite normal, and it does not seem to me that these conditions can be compared to the abnormal development of this bone in civilized man. Compared with the normal development of civilized man they certainly show striking dif-

ferences, but in all three the length of the intermaxillary bones, the inclination of the teeth and the size and shape of the dental arches and their relation to the rest of the face and head are characteristics of the race or species, and I hardly feel that we can say the prognathus or protruded appearance of the denture in primitive man or the anthropoid apes is due to the sutures remaining open longer than in civilized man.

There are many other factors which enter into the particular anatomy of any race or species. I do believe, however, that any influence which might tend to retard the union of the sutures in civilized man might readily have a tendency to overdeve'opment of the intermaxilla which would easily give the appearance of protrusion to at least the maxillary anterior teeth. If one could know that this had taken place in a given case, it would unquestionably influence him in his decision concerning treatment.

With reference to treatment in adult cases in which a pronounced protrusion of the upper jaw and teeth is in evidence, I think very highly of the methods and results in the cases cited by Dr. Federspiel. But I am also convinced that cases at this age are capable of rational orthodontic treatment, provided the teeth are in themselves healthy and present in sufficient number to stimulate through pressure applied to them the bone in which they are implanted. I do not say that in many instances with the adult it is not the wiser plan to remove two premolars and retract the teeth anterior to them. I have, however, secured good results in one or two instances without extracting. The period of retention is very long however, and I am inclined to think that in most cases recurrence is sure to take place, because in the adult the correction of the distal occlusion is usually due to a forward movement of the mandible and not so much to a new and further development of it.

Grünberg called attention to the tendency toward recurrence of distal occlusion in adults, in a paper before the Alumni Society of the Angle School, illustrating his remarks by slides of a case in which he not only corrected the distal occlusion, but put in pronounced prosthetic restorations to aid in guarding against a recurrence. The occlusion was maintained, but after two or three years the jaw had slid back toward its original position. In other words, the alveolus had slid forward on the mandible, or had been gradually absorbed and rebuilt in a new and more anterior position upon the mandible, leaving the profile lines of the face which had been beautifully corrected, about the same as they were originally. This, and my own experience, would seem to confirm Dr. Federspiel's assertion that in the adult the correction of distal occlusion is chiefly by the patient assuming a more anterior position of the mandible in re'ation to the maxillary thus bringing the condyles forward in the fossa, and that all the forces which operate upon the mandible tend to bring it back gradually.

The muscles and all the soft tissues of the face which have for so long accommodated themselves to the abnormal position of the mandible will for a long period tend to draw it back into that same old position, so that such cases in adults have to be watched almost indefinitely.

The accommodation of the muscles and soft tissues in children comes about very much more quickly, because they are still in a growing state and may be induced to grow normally just as well as abnormally, while in the adult it is a case of correcting an abnormal growth and producing often a secondary alveolus, yet insofar as function can be established and maintained, sofar will treatment be successful in adults, and this is often considerable.

Regarding the muscular mechanism which produces the distal occlusion in adenoid mouth breathers, I have evidence to support Dr. Federspiel's theory in an article I read before the Laryngological Section of the Maryland Medical and Chirugical Faculty several years ago, and from which I quote: "I have stated that cases belonging to this class are practically always due to adenoids, and I believe this to be true because of their anatomic position in the respiratory tract in the following manner: as they increase in size the space above and back of the soft palate is diminished until nasal breathing is no longer possible and mouth breathing is fully established, which means, of course, that instead of the teeth being in occlusion, as is natural during the usual periods of repose, they are separated, the mouth being open to breathe, and the influence of the normal re'ation of the

inclined planes of the teeth upon each other is lost. The muscles of expression and mastication are also functionally perverted, and the influence of the tongue (the normal counterbalance to the external muscular pressure) is reduced to the minimum, as it no longer fills the oral cavity in which it is ordinarily sustained when the lips are in normal contact by exclusion of the air, a slight partial vacuum being formed between it and the posterior portion of the palate. Not only is the tongue not sustained in the roof of the mouth, but it is actually depressed and maintained in that position to relieve it from contact with the soft palate, which cannot be raised as when the pharyngeal tonsil is normal. To accommodate this depressed position of the tongue and aid in maintaining a free opening for air, the contraction of the mylohyoid and geniohyoid muscles above, and the sternohyoid and omohyoid muscles below takes place, which opens the throat and straightens out the angle between the body of the jaw and the neck, as may readily be observed in anyone, and becomes in the class of deformities under consideration a distinguishing diagnostic symptom. The contraction of the muscles forming the floor of the mouth (the mylohyoid and geniohyoid) also reacts upon the jaw in a tendency to draw it distally, and in the young subject its influence is soon marked by distal occlusion of the teeth when the jaws are closed, as occurs in these cases only in mastication and swallowing. I do not mean to say that the lower jaw is actually drawn very much distally, but it is to an appreciable extent, and this together with its retarded development, is sufficient to permit the inclined planes of the erupting molars to engage distal to normal, after which every closure of the jaws in mastication tends to slide them into complete distal occlusion, after which it is rare indeed that the jaws regain their normal relations without aid, even though the adenoids have been removed and normal breathing resumed. Imagine these conditions obtaining for a considerable period of time at any stage in the child's development, and it is easy to see how he will grow into the deformity.''

DEPARTMENT OF
DENTAL AND ORAL RADIOGRAPHY

Edited By

Clarence O. Simpson, M.D., D.D.S., and Howard R. Raper, D.D.S.

RADIOGRAPHY AS AN AID TO DIAGNOSIS IN ORTHODONTIA

By Dr. Irving Spenadel, New York City

THERE are many different methods of acquiring information which may aid the orthodontist in diagnosing a case both in early and late life. One of the best methods, though not the most commonly used, is radiography, which, in my opinion, gives a very comprehensive understanding of the vital tissues involved, and perhaps an insight into some of the failures met with in orthodontia. This method is found extremely useful by internists in their work when examining for glandular internal disturbances. To diagnose accurately by means of the radiograms requires an expert radiologist; one man cannot concentrate on two or more specialities, and do them equally well. The slightest variation of one radiogram from another will very often be extremely significant, and indicate a condition which only an expert could deal with.

In the study of radiographic plates, a thorough knowledge of the living normal anatomic conditions should be acquired, so that we can understand what we see in living pathologic conditions and recognize the lesions of various diseases during life. This would be easy were we to study life in the adult only, but it becomes complicated when we have to study the various conditions which have taken place in life leading up to this change. In young individuals, manifold changes take place continually, and the younger the individual, the greater the change. Therefore, a knowledge of the living anatomy of each period of growth is of utmost importance for recognition of anomalies, of congenital conditions, and of diseases.

The study of radiographic plates gives us a large part of the living anatomy and the pathology of either an early or late stage of disease, and thus enables us to decide on the nature of the disturbances with the aid of a competent diagnostician, long before the findings of a postmortem table could be utilized. Formerly, anatomists had to resort to the cadaver in connection with the appearance and development of centers of ossification at different ages and for the two sexes. Yet, without this knowledge, ortho-

dontists cannot treat intelligently a great majority of the cases which present themselves.

During the development of bones, the epiphyseal line illustrates the relationship of the diaphysis and the epiphysis to each other and to their surrounding structures. From this it can be seen that the epiphyses present a very definite anatomic appearance at different periods of life. This not only appears in the epiphysis of a special joint, as the wrist, but of different joints, as compared with one another. Crampton showed in his work on pubic hair that there is decided variation in the development of individuals at certain ages. When we wish to ascertain the normal conditions of various stages in life, some standard index, such as the changes in the epiphysis, is more reliable, says Rotch, than the usually accepted standard of months, and years. The wrists and hands are the more practical anatomic parts to use as a standard index on which to establish a classification based on growth. A group of children of the same age may represent four or five anatomic ages.

Dr. Rotch has established certain standards by which we can personally determine anatomic ages in early life. Following this standard as closely as possible with our own observations regarding the normal and abnormal of anatomic and chronologic age, it can more readily be determined by the radiogram than by other methods—what the patient's true age is, and what the possibilities for success are, and how near normal the individual is to the chronologic age.

In studying the radiogram for orthodontic purposes so as to determine a child's normality or abnormality at a certain chronologic age, the diaphysis and epiphysis must be understood. The long bones have an epiphysis at each end with the exception of the clavicle, metatarsal and metatarpal bones, and the phalanges of the hand and foot which have only one.

The epiphyses are the most important centers of the bony skeleton, for on them depends the future development, especially that of infancy and childhood. A knowledge of these changes is important for it is at these centers that disease may begin and from which it may disseminate. The time of the appearance of the epiphysis of the carpus, metacarpus and the phalanges of the first, second and third rows are the carpus, from birth to the fifteenth year, the metacarpus about the third year, and the phalanges, the third to the fourth years. The long bones are considered the most important bones in the osseous system, and therefore they can be taken as a basis for diagnosis and be better understood than the others. During the first three months of intrauterine life, the osseous system is practically cartilaginous in character. Soon after this a process begins and extends toward the extremities. A short while later a further process extends here and there in the end of the bones. The epiphyses, however, do not join the shaft until growth has ceased, but remain separated by a cartilaginous tissue, the epiphyseal cartilage. If, however, some disturbance has taken place in infancy of such a nature as to hinder the normal growth of the child, the epiphyseal cartilages will not completely join the shaft until a long time

after they should. If no disturbance of a nutritional or glandular origin takes place, the epiphyses will join at their respective times in life.

The carpal bones develop usually from a single center and are cartilaginous at birth. The osseous centers of these, under normal conditions, usually appear in the following order according to Rotch. "The os magnum and the unciform bones appear very soon after birth, the former usually appearing before the latter, the cuneiform in the second or third year, the semilunar about the fourth or fifth year, the trapezium about the fifth year; the scaphoid at the fifth or sixth year; the trapezoid from the sixth to the eighth year, the pisiform in the twelfth year."

Fig. 1.

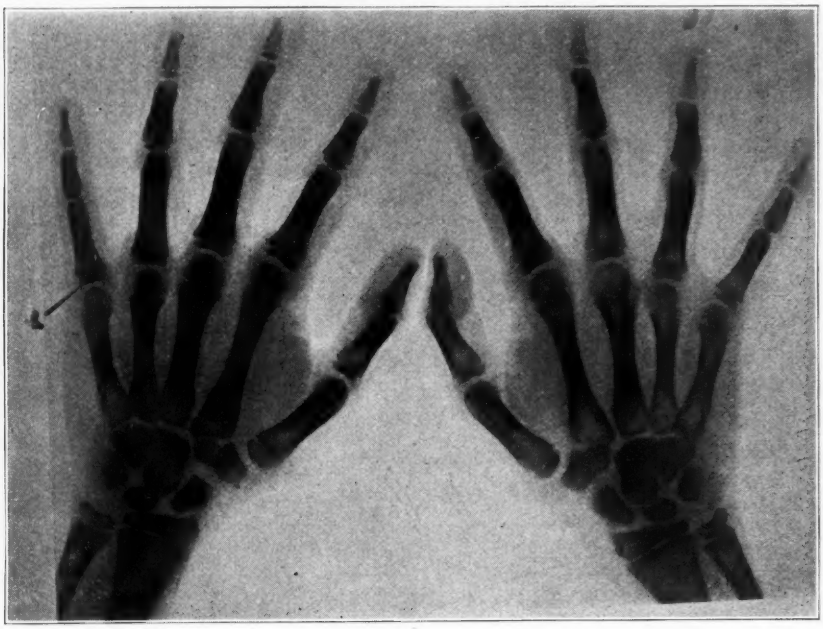

Fig. 2.

According to Prior the appearance of the trapezium, scaphoid and trapezoid varies, and in his cases the trapezoid precedes the trapezium but the scaphoid precedes the trapezoid. He also found that at the same chronologic age, the carpal bones of girls are in advance of those of boys, especially during pubescence. Dr. Milo Hellman in his research work on orphan children, sets this also at about the same age. However, it is not so much the order in which these bones appear which is significant, as the number that are present, their position and shape.

The metacarpal bones are developed from two centers; one for the shaft, sixth week of fetal life, and one for the epiphyses. The ossific center for the epiphyses for the metacarpal bones appears about the third year, sometimes a little earlier. The phalanges develop from two centers, one for the shaft and one for the approximal ends.

A proper understanding of the anatomic development and their periods

of ossification enables us to determine the anatomic age from the radiogram. However, the understanding of the anatomic age as compared to the chronologic does not in itself end our responsibility to our patients. We must not sit back and say "I have it, John Doe is undersized; his epiphyses are open." We must go further and try to determine by study the etiologic state responsible for the condition.

The orthodontist in his daily practice is in a better position than the physician or internist to study the osseous deformities and their causes; for

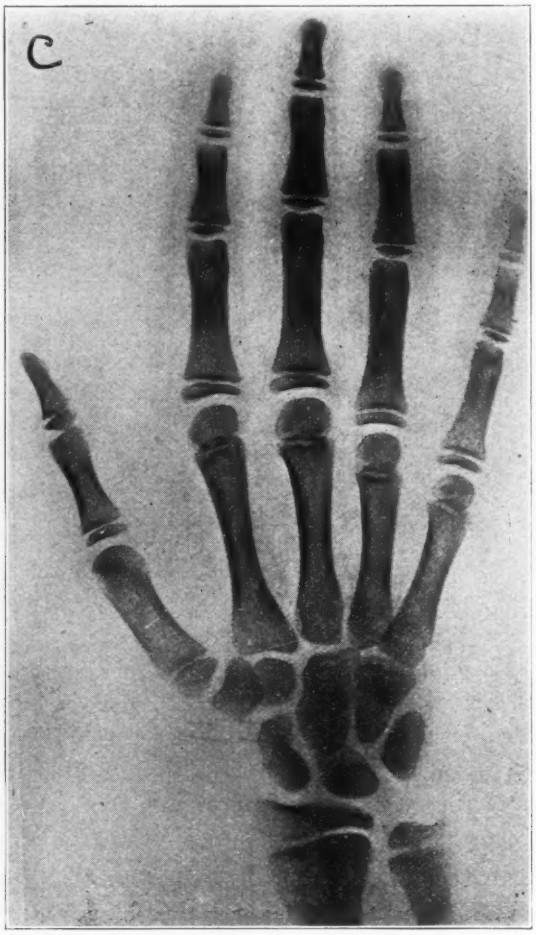

Fig. 3.

Fig. 4.

the orthodontist with a better understanding of the action of the various ductless glands which are stimulated to secrete through certain hormones thus to produce various effects, beneficial and otherwise, upon the bony frame work of the individual, will be in a position to advise his patient regarding the proper course of treatment.

It has been shown, experimentally and clinically, that lack of stimulation and assimilation, or overstimulation will produce abnormal conditions in the development of the child.

The thyroid is especially associated in the exercise of its function with the other generative organs, the liver, pancreas, adrenals, and pituitary

glands. It also maintains the nutrition of the cells of those organs, stabilizes the sympathetic nervous system and the agency of the pituitary; the other ductless glands control bodily growth.

In deficiency of the thyroid, ossification is greatly delayed in long bones. The zone of proliferation between the diaphyses and epiphyses is narrowed and union is late, or lacking. Here the radiogram provides a valuable means of determining the possibility of growth in these cases by showing the epiphyseal bones joining with the diaphyses.

To illustrate the difference between the anatomic age and the chronologic

Fig. 5.

age, let us examine an x-ray plate of a normal child three years of age. Fig. 1. *r* shows the lower epiphysis of the radius; *b* and *d* show the unciform and os magnum respectively; *g* either the trapezium or scaphoid; *e* the beginning epiphysis of the metacarpal bones.

Fig. 2 presents the normal hands of a boy, 9 years old, showing the epiphyses of all the digits and metacarpal bones already formed. The carpal bones have already made their appearance with the exception of the pisciform bone which appears about the twelfth year.

Fig. 3 shows normal hand of a girl, 8 years old. Here is a little later

advancement in the anatomic age over that of Fig. 2, in that the epiphyses of the digits and phalanges are in a more advanced stage, showing that a girl of 8 years is in a more advanced stage of development than a boy of the same chronologic age.

Fig. 4 shows a normal boy of 10 years, and by comparing both plates you will see that they are about the same age anatomically, even though there is a difference of two years between the boy who is 10 and the girl who is 8

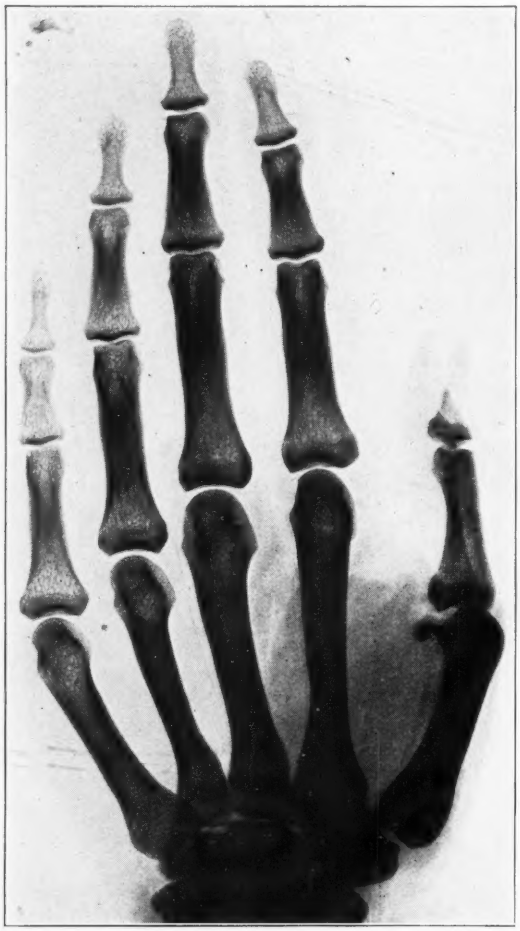

Fig. 6.

years. Dr. Hellman in his observation on growth in reference to malocclusion makes mention of the same difference.

Fig. 5 shows what is considered to be a normal girl of 13 years 4 months. Here you will notice that the epiphyseal cartilages of the metacarpal phalanges and digits have already fused with their respective diaphyses.

Fig. 6 is another girl, 13 years, 6 months and presents the same condition as Fig. 5. With a clearer understanding of what may be considered normal anatomically for certain correspondingly chronologically normal, we can differentiate the abnormal. Let us examine the hand of a girl, 8 years of age (Fig. 7.) and compare it with a girl anatomically normal for the same age

as shown in Fig. 3. Here we see a difference in structure and development in bone. The carpal bones are not normally developed in size or shape. The center of ossification for the trapezium is missing, a great translucency in

Fig. 7.

Fig. 8.

Fig. 8-A.

osseous structure, rounded diaphyses of the metacarpal bones. The type of malocclusion was the posterior relation of the mandibular teeth to the maxillary teeth with marked hypoplasia of all anterior teeth. The child was sent to a well known internist in the city and diagnosed as a case of myxedema and placed on a thyroid treatment. Orthodontic work was not deemed advisable until the child responded to treatment.

Fig. 8 and Fig. 8-*A*. Girl, 13 years, 8 months; posterior occlusion micromandibular development and extreme hypoplasia of all teeth. Blood test

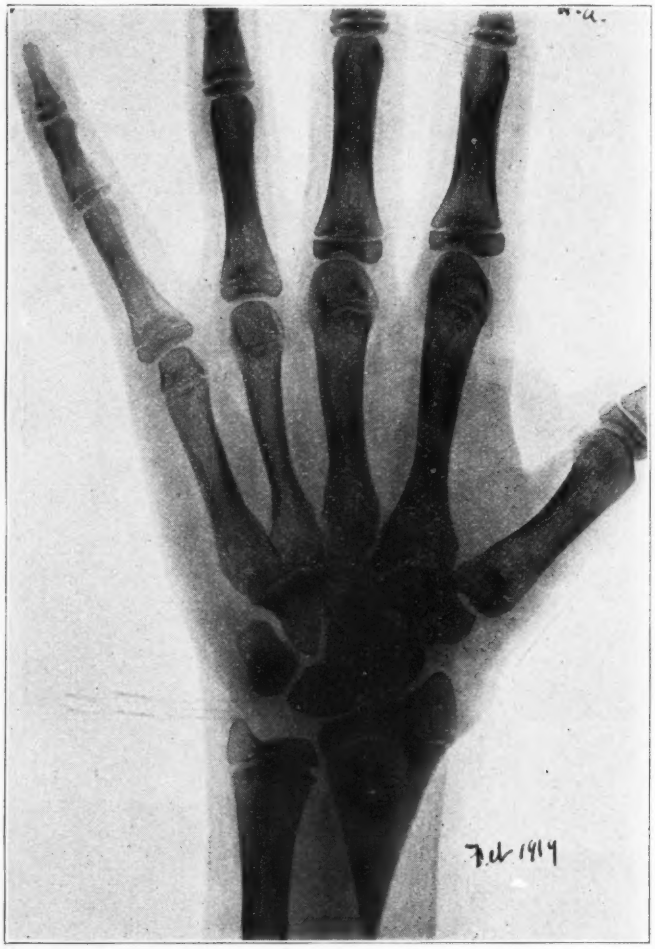

Fig. 8-*B*.

negative; noneruption of all second molars. Radiogram of hand Fig. 8-*B* showed epiphysis widely open. Marked thickening of the gingival margin of all the necks of teeth. History of patient showed a marked glandular disturbance at the age of 3 months; operation necessary. After examining the radiogram of the hands, I immediately realized that there was an abnormal skeletal condition for a girl of her age, when the epiphysis would normally be closed—comparing with Figs. 5 and 6 of normal girls at the same age. The girl was also delayed in her menoplania, where the children in Figs. 5 and 6

passed through that condition. Girl was placed on thyroid and pituitary treatment for one year, and showed marked improvement in weight and entire general condition. Orthodontic prognosis still poor after two and a half years of treatment. Radiographic examination of hands still shows opening of the epiphyseal cartilages. In May, 1922, a second picture was taken, Fig. 8-*C*, which shows a more advanced stage in the closing of the epiphyseal cartilages. Progress still poor.

It is only recently that I examined a physician's son five years of age,

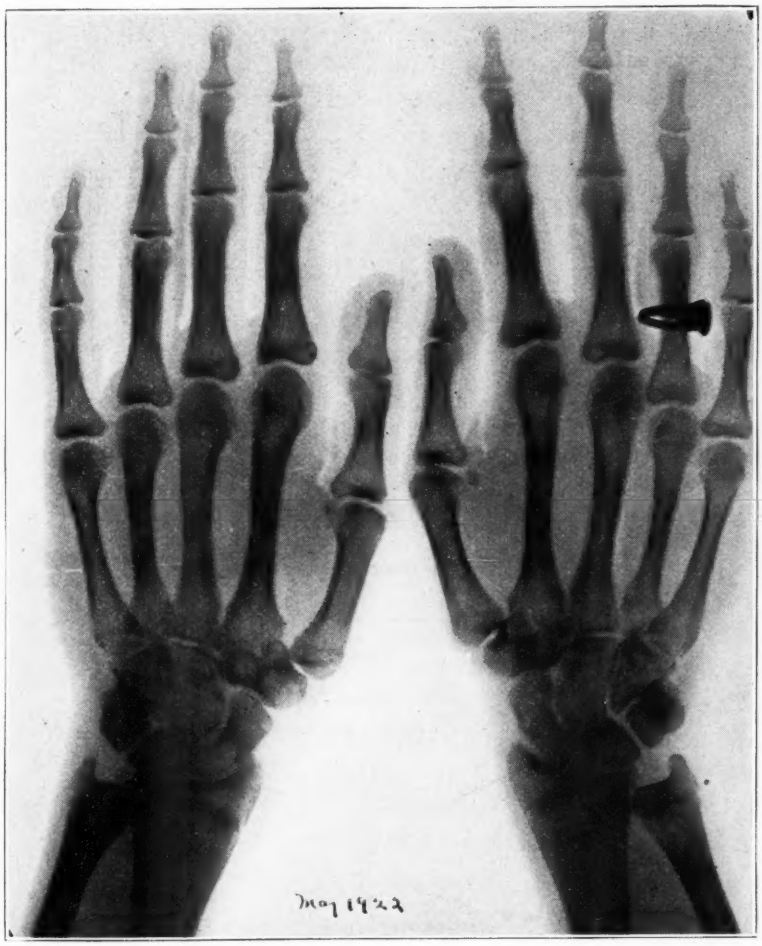

Fig. 8-*C*.

with a full complement of deciduous teeth, and a marked overdevelopment of the mandible. The boy is backward in studies at school, the expression of the face is not what I would consider bright. A lateral view of the skull revealed a moderate size head suggesting the exencephalic type. Also the middle fossa of the skull is slightly depressed, and there are evidences of intracranial pressure. The sella showed slight enlargement for a child that age. I sent the boy back to his father and suggested that he be examined for his endocrines. This advice was followed and orthodontic work was advisedly delayed while the boy is being observed and placed upon pituitary treatment.

SUMMARY

Radiography, though not a positive form of diagnosis, especially in the oral cavity because of its anatomic construction, nevertheless acts as a great aid if properly studied and employed. However, in the other parts of the skeleton greater exactness and definition can be obtained, due to architectural construction. Therefore it is a basis for a more exact diagnosis as an aid in certain lines of study and treatment. In orthodontia radiography can be of assistance to the patient and operator, in that the operator can determine prior to treatment the amount of success obtainable, or the amount of failure he may anticipate. There are some cases where it is desirable to radiograph the skull in order to determine true conditions of the sella, for either an enlargement of the hypophysis or some cranial pressure responsible for overdevelopment of the mandible; and to decide whether it is more practical to send the patient to some specialist better skilled to treat that abnormal condition than to immediately proceed with orthodontic measures and have regrets afterwards. It may be advisable in many of these types of cases not to treat them orthodontically, as the prognosis is poor, and failure will reflect upon the poor judgment of the operator.

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THE TECHNIC OF ORAL RADIOGRAPHY

By Dr. Clarence O. Simpson, St. Louis, Mo.

REGIONS IN DETAIL (Continued)

Mandibular Canine Region

(*Continued from page* 792.)

Position of Head. Lateral. Occlusal plane horizontal. Anteroposterior. Reclined sufficiently for the longitudinal axis of the canine to be vertical when the mouth is open for the reception of the film packet.

Vertico-horizontal Angle of Projection. Fifteen degrees below horizontal.

Modifications. Twenty degrees below horizontal where the root is exceptionally long, or the film packet cannot be adapted as usual.

Mesio-distal Angle of Projection. Perpendicular to the labial ridge of the canine.

Modifications. Compensation for an extreme mesio-distal inclination of the canine.

Placement of Film Packet. Longer dimension vertically. Lower mesial corner slightly bent. Place packet to include the root of the lateral incisor, unless the incisor roots are markedly convergent, and to extend dis-

tally to the width of the packet; occlusally to include the cusps of the teeth in symmetrical relation to the end of the packet at the angle of projection.

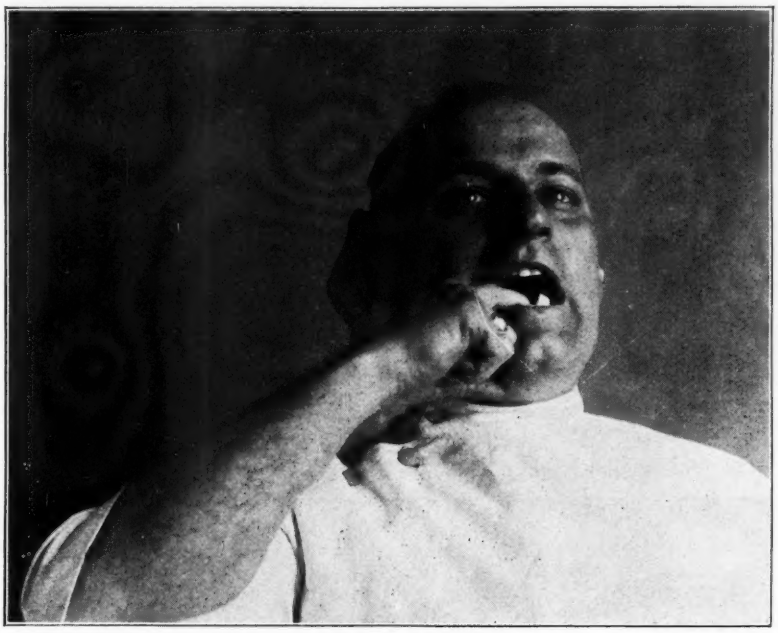

Fig. 1.—Position of film packet and retaining hand for the mandibular canine region.

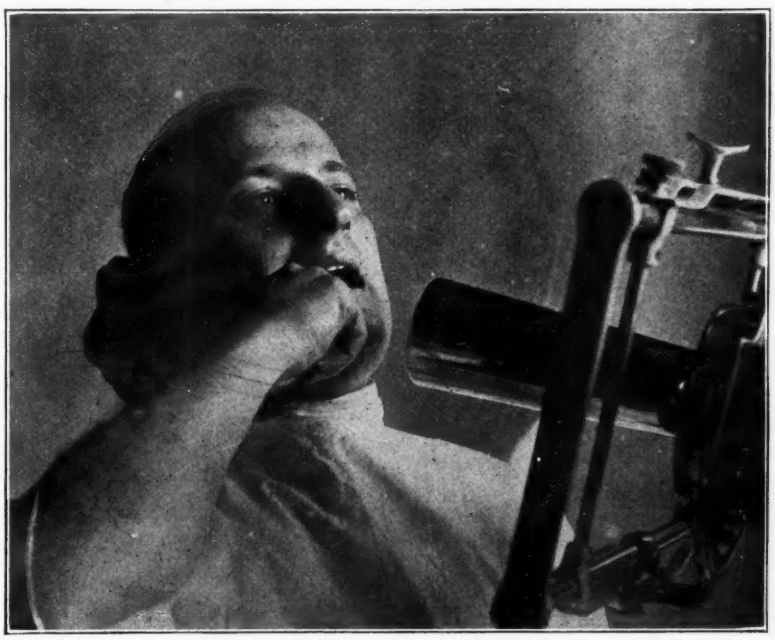

Fig. 2.—Position of patient and cone for the mandibular canine region.

Retention of Packet. First finger of patient's opposite hand placed near the lower mesial corner of the packet, thumb rested on the lower border of mandible below the opposite premolars, and unemployed fingers flexed.

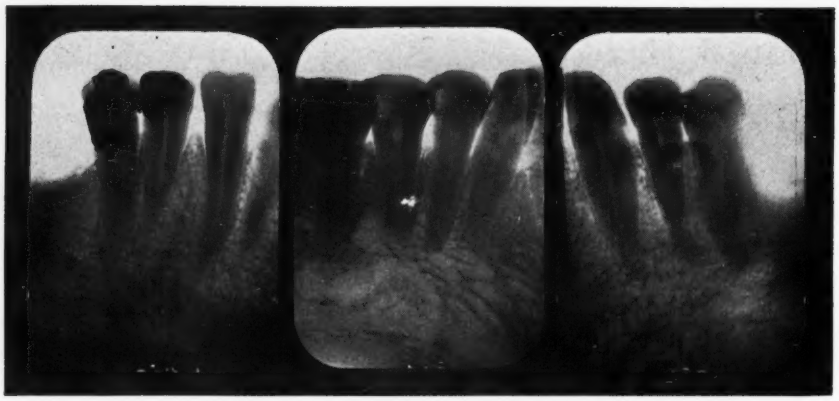

Fig. 3.—Typical views of the mandibular canine region.

Fig. 4.—Views of the mandibular canine region where the roots are unusually long.

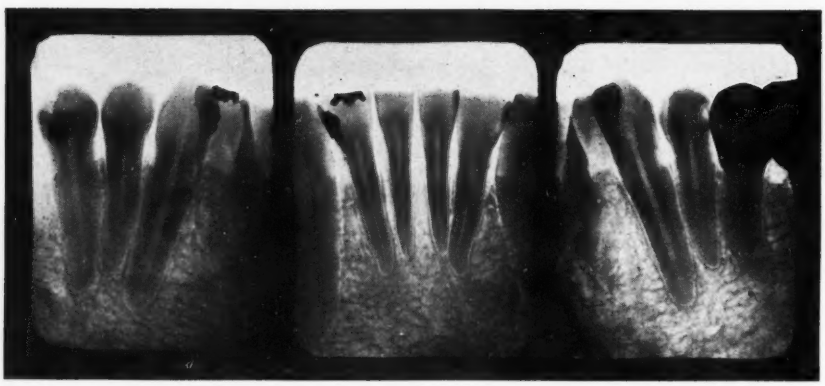

Fig. 5.—Views of convergent incisor roots illustrating the distortion resulting from an attempt to include the lateral incisors with the canine region under these conditions.

Cone. Centered midway the first premolar root.

Spark Gap. 4 to 4½ inches.

Exposure. 90 to 120 milliampere seconds at an 18 inch target-film distance.

Explanatory Description. The placement and retention of the film packet with the discomfort involved, and the tendency to distortion of the image are the principal difficulties encountered in examination of the mandibular canine region. The length of the canine root and the sharp curve of the dental arch in this region prevent examination of the canine to the best advantage in the normal view of the incisors or premolars. However, in

Fig. 6.—An illustration of divergent incisor roots where the lateral incisor can be examined more accurately with the canine region.

Fig. 7.—An example of the mental foramen being superimposed at the apex of a pulpless premolar in examination of the first molar region, and the diagnosis corrected by the diagonal view of the premolars in the canine region.

examination of the canine region, a diagonal view of the premolars and in some cases of the lateral incisor can be obtained. This diagonal view discloses the relative location of the mental foramen to the premolars, and when the roots of the incisors are divergent, it records the image of the lateral incisor more accurately than in the median view. When the incisor roots are convergent, only a portion of the lateral incisor crown should be included with the canine to avoid excessive distortion of the image.

The marked bending of the film packet in the mesial third necessitates a compensatory direction in the mesio-distal angle of projection, and a common mistake is directing the rays from a point too far distally. Modifications of the mesio-distal angle of projection may be required for variance in the mesio-distal inclination of the canine, but this factor is corrected to a great degree by the pose recommended. Reclining the head to place the longitudinal axis of the canine vertically for examination of this region will be found a distinct advantage over the poses generally suggested for examination of the mandibular teeth.

To project the images in symmetrical relation to the upper end of the films, the distal corner of the packet must be placed about 3 millimeters farther above the occlusal plane than the mesial corner, because of the greater mesio-distal diameter of the premolars than the canine and lateral incisor.

ABSTRACT OF CURRENT LITERATURE

Covering Such Subjects as

ORTHODONTIA — ORAL SURGERY — SURGICAL ORTHODONTIA — DENTAL RADIOGRAPHY

It is the purpose of this JOURNAL to review so far as possible the most important literature as it appears in English and Foreign periodicals and to present it in abstract form. Authors are requested to send abstracts or reprints of their papers to the publishers.

Health, Sickness and Death as Related to Dental Infections. G. Osgood (Rockland, Mass.). New York Medical Journal and Medical Record, August 1, 1923, cxviii, 3.

Seven years before writing this paper the author thought little on this subject, but from witnessing the improvement of various diseases following the extraction of certain infected teeth he has become a believer in focal infection as a prolific cause of ill health. On the other hand the freedom from minor ailments in certain edentulous subjects caused the author to make a special study of this type, comprising over 100 persons, nearly all with both jaws edentulous. In one group of 33 who had lost all of their teeth before the age of twenty-five, longevity did not seem curtailed. Seventeen had reached the age of sixty and of these two had reached their eighties. In another group who lost their teeth between twenty-five and fifty 41 lived to be over sixty and 13 reached their eighties, while 3 lived into their nineties. Those of Group I seemed remarkably free from major and minor ailments and especially from those which we commonly associate with focal infection. The members of Group II, who had lived much longer with their teeth, were not so free on the whole from petty ailments, but many of them as individuals compared well with those of Group I. While retention of sound teeth ought to be and doubtless is an asset, the contrary opinion that the edentulous are short-lived is not borne out by the facts; apparently good sound teeth or no teeth at all are equally an advantage compared with the possession of poor teeth.

The author knows of six cases of suicide in middle-aged people in which suffering due to infected teeth was the only cause of the action which could be ascertained.

Prophylactic Odontotomy. T. P. Hyatt (New York). The Dental Register, May, 1923, lxxvii, 5.

The author refers, as his subtitle indicates, to the operation of cutting into a tooth to prevent disease. As dentist to the Metropolitan Life Insurance Company he controls many first-hand statistics. Some of these

show the very great frequency of loss of the first permanent molars—in some statistics amounting to nearly 50 per cent, this loss meaning a great sacrifice of masticating efficiency. The latter is impaired in some 70 per cent of subjects examined. The loss is not computed for the individual, but for large groups, as employees of the Company, high school students, etc. Thus the percentage of first molars lost is calculated from the total number of first molars in the group examined. In 8000 high school pupils the total loss or bad decay of first molars amounts to 25 per cent of the total. The practical problem involved here consists in cutting into the occlusal surface of the first molars and preventing the decay, which begins in the occlusal pits and fissures. Occlusal cavities greatly outnumber others. The remedy is simply to do away with the pit and fissure before decay sets in at all and then fill the artificial cavity. How this should be done is left wholly to the practitioner. As for the best time the sooner the better—just as soon as the tooth is erupted. What is said of the first molars applies, of course, to second molars and premolars. Cavities in other surfaces are rare enough to be let alone in this plan of prophylaxis. It is of course evident from the ethical standpoint that the dentists must stand together in this reform. The charge of making a cavity in a sound tooth has usually been made against unethical dentists and the patient should be enlightened as to the reasons for filling sound teeth.

Dental Rheumatism. Subirana (Madrid). La Presse Dentaire, June, 1923, xxv, 6.

Maranon, the well-known Spanish authority on internal secretions, makes use of the term "dental rheumatism" as a sort of substitute for focal infection of joints. The author himself, who is a dentist, has become a partisan of this theory which seems limited to focal infection in the narrow sense although as he states it might have been made to include pyorrhea as well. In other words caries is indispensable for the genesis of Maranon's dental rheumatism. Subirana has three recommendations to make for the prophylaxis of dental rheumatism. The first is the attempt to mummify the pulp before it can putrefy. The second is a reaction against the use of devitalized teeth in making crowns and bridges and the third resource is a campaign of education among the people to care for the teeth before caries appears.

Cases are cited which do not well accord with any conception of rheumatism, in which the symptoms could be traced to caries or poor dentistry. In one patient there was severe headache with slight elevation of temperature. In three others there was also severe headache with persistent elevated temperature, while another suffered from a continued fever without pain. It is related of the first patient that in addition to her headache she suffered much from pains in the nuchal muscles when she leaned her head back in the chair. In all of the patients the symptoms subsided on proper treatment of the canals.

The Heat Pain in Pulp Disease. W. Meyer (Göttingen). Zeitschrift für Stomatologie, June, 1923, xxi, 6.

The author divides pulpitis into total and partial, and purulent, ulcerous and granulomatous. The objective symptoms of this group of affections often leave something to be desired and then the patient's sensations may be of value in diagnosis. He describes the history of the tooth trouble and the amount and quality of the pain, but the most importance is naturally attached to the pain experienced through application of heat and cold. Indeed it is often this sort of sensation which first brings the patient to the dentist. This subject is adapted to intensive study by the use of different temperatures. There is of course a threshold for pain in each individual case. If we use heat a low point will be reached beyond which little or no pain will be induced while conversely a very high temperature may bring out pain in cases where ordinary tests are negative. Sound teeth will feel pain if the temperature goes low enough and there is much individual variation. Thus while some men stand 5° C. and the ethyl chloride spray without any sensation others are affected by a temperature of 25° C.

In many personal observations the author has found that in 90 per cent of all cases tenderness to warmth means purulent pulpitis while this symptom is constant for all cases of this disease. On the other hand it is only occasionally present in ulcerous and gangrenous pulpitis. It is also a constant symptom in total pulpitis so called if the stage is sufficienty advanced.

Deafness Viewed from a Dental Standpoint. H. O. Brown (Rochester, N. Y.). Oral Health, August, 1923, xiii, 3.

It has been conclusively shown by dentists that certain cases of deafness are curable by correcting the position of the condyle head within the glenoid fossa, and the author himself has several cures of this type to his credit. His method is the simple application of a splint along the occlusal surfaces of the teeth, thus elongating the bite. The addition of 1 mm. to the latter is sufficient. A temporary or trial splint is first applied before any attempt to fit the more expensive and difficult gold splint. The vulcanite should be attached with clasps and not permitted to extend down upon the buccal surfaces of the teeth. The cases treated by the author fall under three classes, viz., general abrasion, malocclusion and loss of teeth. The result in all of these conditions is the same—the condyle tilts back and impinges on the external auditory meatus and the aim of the treatment is to check this impingement. The mandible does not swing from the exact center of the condyle as from a hinge but rather from a point midway between the condyle head and the angle. The impingement can be felt by standing in front of the patient and placing the little fingers in the ears until they enter the external auditory meatus with the thumbs resting on the forehead. The patient is now asked to open and close his mouth, when it often happens that intense pain is felt. In closing, the mandible passes the correct position and the operator can usually feel the backward thrust of the condyle which the treatment seeks to antagonize.

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EDITORIALS

Nomenclature

THE October issue of the Dental Items of Interest contains an editorial by the editor on "Occlusion and Articulation." This editorial is a discussion of the use of the two terms and calls attention to the terms adopted by the Committee on Nomenclature of the American Dental Association.

A full report of the committee will be published in the November Dental Journals but as the Dental Items of Interest has seen fit to discuss "Occlusion and Articulation," we do not believe we will be betraying a trust if we also consider those terms at this time. The editor of the Dental Items of Interest in discussing the word "articulation" calls attention to the fact, which has been recognized previously, that the word "articulation" is greatly over-

worked in the science of dentistry because it has at least three distinct meanings: first, "articulation, as employed in referring to the assembling of the teeth or the arrangement of teeth; secondly, articulation, as related to the end of one bone to the other, (for example, the temporo-mandibular articulation); and thirdly, articulation, as related to speech." These three uses of the term are confusing if not unscientific. It is our belief that "occlusion" covers everything that "articulation" is made to imply, as related to the arrangement or function of the teeth. It is indeed unfortunate that the Committee on Nomenclature of the American Dental Association did not recommend the elimination of the term "articulation" as having anything to do with the teeth. The definition of articulation given by the committee is as follows: "The arrangement of artificial teeth to conform to the requirements of the edentulous space or spaces which they are to occupy, and to serve adequately the purposes of the natural organs which they are intended to replace. Note: 'articulation' refers to the actual placing of artificial teeth, one by one in the required position. But articulation is not to be used to describe the occlusal relations of artificial teeth after they have been so arranged." This definition seems to be something which the committee has forced into their report in an attempt to save the word which should have been discarded years ago as it related to the arrangement or function of the teeth.

"Occlusion" is defined as follows: "The contact of the teeth of both jaws when closed or doing those excursive movements of the mandible which are essential to the function of mastication." We believe that this definition is faulty when the committee says that the occlusion is "the contact of teeth." If they will make a study of the dentition of many lower animals they will find some of the most functional teeth never come in contact; however, we believe those teeth have an occlusion because they are in a position which nature intended for that particular animal, and also perform their proper function. In the editorial in the Dental Items of Interest, the editor states that a tooth cannot be in occlusion which does not have contact. We believe such a statement is based on a lack of knowledge of what is meant by occlusion from a functional standpoint. We believe a better definition of occlusion would be: "The arrangement of the teeth in both jaws in such a manner as to enable them to perform their normal function in mastication." It must be remembered that the "function of mastication" includes several different divisions, as prehension and deglutition in the lower animal, and teeth which are used for these purposes do not always have contact with the teeth of the opposing arch.

We have before us a letter from Dr. Benjamin L. Brooks, of Lynchburg, Va., enclosing a copy of a letter addressed to the Editor of the Dental Items of Interest. In this letter Dr. Brooks calls attention to the inadequate interpretation of the terms normal occlusion and malocclusion, and states that he suggested to the Committee on Nomenclature of the American Academy of Periodontology, at the recent meeting in Cleveland, Ohio, the use of "bio-occlusion" for "normal occlusion" and "patho-occlusion" for "malocclusion." Probably in the minds of some "bio-occlusion," as interpreted by

Dr. Brooks, would be a more comprehensive term than that of occlusion or normal occlusion. In defining "bio-occlusion" he says, "it would mean the complete biologic mechanical harmony of the supporting structure together with such harmony of the cuspal and axial relationship of all teeth to the direction of stress when the teeth are in function--a life occlusion." The definition which Dr. Brooks gives for "bio-occlusion" is the conception or understanding that we have always held of normal occlusion or functional occlusion. "Patho-occlusion" as Dr. Brooks defines it is "an inharmony of the above relationship to a degree that would produce pathologic changes in one or more teeth and supporting structure, at any time during the life of the organ. This would include all teeth in malocclusion, nonocclusion, and traumatic occlusion; teeth with loss of form from wear, accidents and operative procedures, either in natural or in the substitutes."

"Patho-occlusion," therefore, includes all that we have considered under malocclusion. However, we have one objection to the term "bio-occlusion," because biology deals with the function of growth of life and a pathologic condition is a living condition. Therefore, "patho-occlusion" is functionally an abnormal "bio-occlusion." We believe that the contention of Dr. Ottolengui that occlusion covers the entire subject is well taken, and if the definition of occlusion is changed to include the function of the teeth of all animals, whether they are in contact or not, there is no reason for any terms other than occlusion and malocclusion as they are understood by many today.

ORTHODONTIC NEWS AND NOTES

Dewey Alumni Clinic

A merger of the College of Dental and Oral Surgery with Columbia University was consummated July 1, 1923. University rules make it impossible to continue the clinic of the Alumni Society of the Dewey Alumni School of Orthodontia at the above address, in consideration of which arrangements have been perfected for the treatment and care of the two hundred or more cases now registered, and those having appointments for treatment on and after October 1, 1923, will report at 252 Lexington Ave., (corner of 35th Street). New patients will receive the same service as was accorded at the old address. The patients will be under the care of Dr. Dewey and his assistants.

Southern Society of Orthodontists

The third annual meeting of the Southern Society of Orthodontists will be held at the Hermitage Hotel, Nashville, Tenn., on Monday and Tuesday, January 21 and 22, 1924. An attractive program is assured and all those interested in orthodontia are cordially invited to be present.—Oren A. Oliver, President, 440 Lambuth Bldg., Nashville, Tenn.; Harry A. Holder, Secretary-Treasurer, 332 Lambuth Bldg., Nashville, Tenn.

The American Society of Dental Radiographers

The mid-winter meeting of the American Society of Dental Radiographers will be held at the Drake Hotel, Chicago, Ill., January 15 and 16, 1924, Tuesday and Wednesday. The program committee is arranging an exceptionally good program.—Dr. Arnott A. Moore, President, 131 Allen St., Buffalo, N. Y.; Dr. Martin Dewey, Secretary-Treasurer, 501 Fifth Ave., New York, N. Y.

Kentucky State Dental Association

The next annual meeting of the Kentucky State Dental Association will be held in Louisville, Kentucky, April 7, 8, 9, and 10, 1924. Headquarters at Seelbach Hotel. A program of unusual interest is being arranged.—N. B. Smith, President; Wm. H. Randall, secretary, 1035 Second St., Louisville, Ky.

Second Mexican Dental Congress

The Second Mexican Dental Congress will be held in Mexico City, December 10-15, 1923.

News and Notes

Dr. Frank H. Harrison announces the removal of his office to 1407-9 Amicable Bldg., Waco, Texas. Practice limited to orthodontia.

Dr. Carlton B. Mott announces change of location to 81 Cotton Ave., Asheville, North Carolina. Practice limited to orthodontia.

Dr. C. Angus Kennedy announces the removal of his office to Physicians and Surgeons Building, 86 Bloor Street, West, Toronto, Canada. Practice limited to orthodontia.

Dr. Samuel Herder announces the removal of his office to 133 West 72nd Street, New York, N. Y. Practice limited to orthodontia.

Dr. Walter Collidge Chapin announces the opening of his office at 681 Fifth Ave., New York City, for the exclusive practice of orthodontia.

Dr. Herbert I. Margolis announces the opening of his offices for the practice of orthodontia exclusively, 366 Commonwealth Ave., Boston, Mass.

Dr. C. Sterling Conover announces the opening of his office at 366 Madison Ave., New York, for the exclusive practice of orthodontia.

Dr. Lewis K. Moberly announces the removal of his office on October 1, to the Heckscher Building, 730 Fifth Ave., New York, N. Y.

Dr. Oren H. McCarty, Orthodontist, and Dr. Ira E. McCarty, Exodontist, announce the removal of their offices, October 1, to Suite 515 Palace Building, Tulsa, Okla.

Dr. F. E. Casey, formerly with Dr. E. M. Griffin of Portland, Oregon, is now located in the Joshua Green Bldg., Seattle, Wash., for the exclusive practice of orthodontia.

Dr. George B. Crozat announces that he will have associated with him in the exclusive practice of orthodontia Dr. Anita L. Crozat. Office at 1224 Maison Blanche Bldg., New Orleans, La.

Dr. J. D. Odeneal wishes to announce his association with Dr. C. C. Howard, 20 Doctors Bldg., Atlanta, Ga., for the exclusive practice of orthodontia.

Dr. Adelbert Fernald announces that on and after December 1, 1923, his practice will be limited to orthodontia. Office, Berkeley Bldg., 420 Boylston St., Boston, Mass.

Dr. H. L. Keel announces the opening of his offices, Realty Bldg., Winston-Salem, North Carolina, for the exclusive practice of orthodontia.

Dr. J. Frank Nelson announces the removal of his offices to Suite 1608, 30 North Michigan Boulevard, Chicago, Illinois. Practice limited to orthodontia.